Developing and Piloting an Exercise Programme for Older Chinese People with Knee Osteoarthritis in Hong Kong

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PREFACE

ABSTRACT

Knee osteoarthritis (KOA) is prevalent in the growing older Chinese population in Hong Kong. Therapeutic exercise for KOA has strong empirical evidence of its effectiveness on reducing knee pain and physical disability in people with KOA provided that they persists in practising the recommended exercise regimen. However, few previous studies have incorporated the client's perspectives into the design of an exercise programme for promoting continual practice of exercise. This study aimed to develop a new therapeutic exercise programme and pilot its acceptability to promote continual practice for older Chinese people with KOA.

A mixed-methods design consisting of two phases was adopted. In Phase I, a purposive sample of 31 older Chinese people with KOA was invited for a semi-structured interview to explore their perceptions and experiences of exercise. Five major categories emerged: typical living pattern with KOA, self-management of KOA, the practice of exercise, views about exercise, and preferences for learning exercise. The findings were used in the development of an exercise programme for this client group.

The Phase II study used both quantitative and qualitative approaches to examine participants' satisfaction with the new exercise programme, adherence to the prescribed exercises, mastering of the exercise movements and health outcomes (knee pain, stiffness and range-of-motion, physical function, muscle strength and endurance of the lower extremities, and quality of life). A convenience sample of 33 older Chinese people with KOA participated in the programme. Seven measurement tools in Chinese versions (if applicable) were used to collect quantitative data from the participants: the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the 12-item Short Form of the Medical Outcome Study Questionnaire (SF-12), a goniometer, the Timed-Stands Test (TST), a satisfaction questionnaire, an exercise diary, and a return-demonstration performance record sheet. Six of the participants were invited for a semi-structured interview to explore their experience of the programme.

The quantitative results showed that the participants were highly satisfied with the exercise programme with a mean score of 90.15 out of 100 (SD = 8.05). Their average exercise adherence was high with a mean percentage of 91.04% (SD = 14.54) and their overall performance in mastering of the exercise movements was good with a mean score of 76.71 out of 100 (SD = 21.75). Most participants' health outcomes significantly improved at three months after the exercise programme, except for the SF-12 physical health summary score. The qualitative findings revealed four major categories: satisfaction with the exercise programme, mastering of the exercise movements, experience of the exercise's effects, and integration of the exercises into the daily routine. These findings were mainly consistent with the quantitative results of the study.

The results of this study showed that the exercise programme was acceptable to the participants in terms of satisfaction with the programme, adherence to the prescribed exercises and mastering of the exercise movements. Therefore, adopting a client-centred approach is likely to be a way forward in the development of exercise programmes for promoting continual practice of therapeutic exercise regimens by older Chinese people with KOA.

論文摘要

退化性膝關節炎普遍發生於人口正在增長的香港老年華人當中。治療性運動被科研証實它有效於減輕退化性膝關節炎引致的痛楚及功能障礙，但患者須持續治療性的運動方案。過往研究甚少將患者的看法融入運動設計中，藉以促使患者持續治療性的運動方案。此項研究目的是要發明一項治療性的運動計劃及初步試驗該項計劃的被接受程度，冀能促進老年華人有退化性膝關節炎患者持續有治療性的運動方案。

此項研究採用混合方法研究設計，分兩期進行。在第一期中，透過立意取樣方法，共有三十一位老年華人有退化性膝關節炎患者被邀請接受了訪問，探索他們對運動的看法和體驗。研究資料中呈現五個類別：退化性膝關節炎患者的典型生活模式、退化性膝關節炎的自理方式、實踐運動、運動見解、及學習運動的取向。研究結果被採用於發明一項治療性的運動計劃。

第二期研究採用了量性及質性研究方法去審查參與者對運動計劃的滿意程度，對運動方案的持續程度，對運動技巧的掌握程度，及健康狀況的轉變(包括膝關節的痛楚程度、僵硬程度、及活動幅度，下肢的生理功能、肌肉的力量和耐力，並生活質素)。透過方便取樣方法，共有三十三位老年華人有退化性膝關節炎患者參加了這次的運動計劃。數據收集工具包括中文版的 the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) 、中文版的 the Short Forms of the Medical Outcome Study Questionnaire (SF-12) 、關節量角尺、the Time-Stands Test (TST) 、滿意程度問卷、運動日誌、及運動技巧表現紀錄表。其中六位參與者被邀請接受了訪問，探索他們對參加這次運動計劃的體驗。

量性研究方面的結果顯示，參與者十分滿意此項運動計劃，以 0-100 為上下限，平均值為 90.15，標準差為 8.05。參與者對運動方案平均的持續程度甚高，平均百分比為 91.04%，(標準差為 14.54)，參與者在運動技巧掌握方面，整體的表現良好，以 0-100 為上下限，平均值為 76.71，標準差為 21.75。大部份參與者的健康狀況，在運動計劃的三個月後有顯著($p< 0.05$)的改善，但 SF-12 Physical health Summary Score 除外。質性研究方面的結果發現四個類別：滿意運動計劃、掌握運動技巧、體驗運動效果、及將運動融入每日常規。質性研究結果與量性研究結果一致。

從參與者所表達對這新發明的運動計劃的滿意程度，持續程度，及運動技巧掌握程度方面來看，研究結果顯示這項運動計劃是得到參與者所接受的。因此，採用以病人為本的方式發明運動計劃，是可能有助於促進老年華人有退化性膝關節炎患者去持續一項有治療性的運動方案。

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LIST OF ABBREVIATIONS

Statistical Symbols

CI	Confidence Intervals
N	Number of subjects
OR	Odds Ratios
p	Probability
r	Pearson product-moment correlation
SD	Standard Deviation
SMD	Standardized Mean Differences
t	Computed value of t test

Other Abbreviations

ACR	American College of Rheumatology
AF	Arthritis Foundation
AIMS	Arthritis Impact Measurement Scales
ASMP	Arthritis Self-Management Programme
BMI	Body Mass Index
CCT	Non-randomized Clinical Trial
C&SD	Census and Statistics Department
COEP scale	Correctness Of Exercise Performance scale
FAST	Fitness and Arthritis in Senior Trial
HKSAR	The Hong Kong Special Administrative Region
KgF	Kilogramme Force
Knee ROM	Knee Range-Of-Motion

Other Abbreviations (cont'd)

KOA	Knee Osteoarthritis
MCS	Mental Health Summary Scale
OA	Osteoarthritis
PCS	Physical Health Summery Scale
RA	Rheumatoid Arthritis
RCT	Randomized Controlled Trial
SF-12	The 12-item Short Form of the Medical Outcome Study Questionnaire
SF-36	The 36-item Short Form of the Medical Outcome Study Questionnaire
SPSS	Statistical Package for the Social Sciences
TENS	Transcutaneous Electrical Nerve Stimulation
TST	Timed-Stands Test
VAS	Visual Analogue Scale
WHO	World Health Organization
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

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CHAPTER ONE

INTRODUCTION

This chapter provides an introduction to this thesis. Firstly, background information about the aging population in Hong Kong, the incidence rate of osteoarthritis (OA) and the healthcare costs associated with OA. Then OA is briefly described and knee osteoarthritis (KOA) is identified as the most prevalent type of OA. The adverse effects of OA are then summarized, and the various treatment modalities for KOA are introduced. This leads to the identification of the need to develop a tailor-made exercise programme for older Chinese people with KOA in Hong Kong. The significance of this study in nursing is highlighted, and the chapter concludes with an overview of the thesis.

The Aging Population in Hong Kong

The proportion of the population who are aged 65 years or above, has been increasing in Hong Kong at an average annual rate of 5.1% over the past 45 years (Census and Statistics Department of The Hong Kong Special Administrative Region [C&SD of HKSAR], 2008). This group constituted 13% of the total Hong Kong population in 2009 and is expected to escalate to 28% by 2039 according to the projection made by the C&SD of HKSAR (2010). In addition, over 99% of this older age group in Hong Kong are ethnic Chinese (C&SD of HKSAR, 2008). Health promotion strategies for the older Chinese people in Hong Kong are therefore justified and imperative in terms of the potential benefits both to those people themselves and to society at large.

The Incidence Rate of OA

OA is the most common joint condition, and a major cause of musculoskeletal pain and disability, in the elderly population (Gabriel & Michaud, 2009). According to the World Health Organization (WHO) (2010a), OA is one of the ten most disabling diseases. 9.6% of men and 18% of women aged over 60 years have symptomatic OA with 80% experiencing limitations in movement and 25% being unable to perform their main daily activities (WHO 2010a). Murphy et al. (2008) have reported that the lifetime risk for symptomatic KOA is 44.7%. In Hong Kong, about one-fifth of the older population suffer from arthritis with the majority experiencing symptomatic OA (Social Surveys Section, C&SD of HKSAR, 2009a). According to the latest epidemiological figures provided by Woo and her colleagues, the most common form of OA is KOA which afflicts 82.2% of the people with OA in Hong Kong (Woo et al., 2003). The prevalence of KOA in men and women aged 50 years or older are 7% and 13%, respectively (Woo & Lau, 2001).

The Healthcare Costs associated with OA

The healthcare costs associated with OA is a matter of concern in Hong Kong. Local epidemiological studies have reported that KOA is a major cause of disease burden in Hong Kong (Woo, Leung, & Lau, 2009; Woo et al., 1997). KOA has also been identified as the major reason associated with more co-morbidities and the development of functional limitations over a period of one and a half years (Chan, Ngai, Ip, Lam, & Lai, 2009; Woo, Ho, Yu, Lau, & Yuen, 1998). In other countries too KOA has been reported as being more responsible than any other disease for disease burden; KOA also interacts with other chronic conditions to aggravate physical disability in the older adult population (van Zyl York & Franken, 2009).

According to the latest published figures on the healthcare costs associated with OA, it has been estimated that the average healthcare cost incurred by the Government could range from HK$10,120 for a person with mild OA to HK$35,700 for a person with severe OA, while the average cost for a person to undergo joint replacement surgery is HK$195,630 (Woo et al., 2003). On the whole, HK$3.5 billion has been spent on the healthcare costs associated with OA annually (Woo et al., 2003). These estimations date from eight years ago and it is likely that the healthcare costs for OA are currently much higher.

Therefore, since the older population is growing very fast, the prevalence of KOA is likely to increase exponentially in Hong Kong. KOA is one of the top agenda items that need to be addressed because its prevalence is so high. In addition, it can subject the older people to functional limitations and represents a charge on society for the considerable amount of healthcare expenditure that entails.

KOA and its Adverse Effects

OA is a type of progressive joint failure primarily concerned with a disorder in the dynamic equilibrium between the break down and build up of the articular cartilage in a synovial joint (Eyre, 2004). It is also a complicated problem as it involves a range of structural and functional disorders that arise in the areas surrounding the affected joint such as muscle weakness and knee instability. Loss and erosion of articular cartilage, subchondral bone remodelling, meniscus degeneration, bone and cartilage overgrowth, reduction of synovial fluid, joint space narrowing and mild synovitis are common pathological changes resulting from OA

(Moskowitz, Altman, Hochberg, Buckwalter, & Goldberg, 2007; Scott & Kowalczyk, 2007).

KOA is more common than OA in other joints. This may be because the knee is the highest loaded weight-bearing joint in a person's body (Brandt, Dieppe, & Radin, 2008). KOA is more prevalent among the old age, females, the obese, and people with a family history of the disease (Felson, 2004; Lau, Lam, Chan, & Kumta, 2007; Zhang & Jordan, 2008). For example, KOA affects 27% of persons aged between 65 and 70 years and this prevalence increases to 44% in those aged 80 or above (Felson, 2004). In addition, structural defects or injury such as malalignment, muscle weakness, meniscus injury, and overloading resulting from such factors as obesity and occupations involving lifting heavy weights may contribute to the development and progression of OA (Hunter, 2007; Lau et al., 2000; Lau et al., 2007; Woo & Lau, 2001).

KOA can affect a person physically and psychosocially. A major clinical feature of KOA is the complaint of deep, aching knee pain, particularly after activities or bearing weight on the affected knee, the knee pain progressively becomes chronic that it also presents at rest or during the night (Hooper & Moskowitz, 2007). Other common clinical features include varus or valgus deformity and flexion contracture, bony enlargement and tenderness, morning stiffness and a 'gel' phenomenon after prolonged sitting that are typically short in duration (no longer than 30 minutes), crepitus that is a 'grating' feeling when the knee moves, and frequent knee instability (Hooper & Moskowitz, 2007; Walker, 2009). Consequently, normal activities of daily living, such as rising from a sitting position, stair-climbing, walking and housekeeping, become increasingly difficult (Hooper & Moskowitz, 2007; Walker, 2009). Therefore, knee pain and physical disability are the major symptoms experienced by people with KOA, and lead them to become physically inactive. Physical inactivity leads to subsequent muscle weakness, atrophy and physical deconditioning and this in turn aggravates the pain symptoms and physical disability, thus setting up a vicious cycle in people with KOA (Dekker, Boot, van der Woulde, & Bijlsma, 1992).

In addition to pain and physical disability, people with KOA have been found to have reduced physical fitness, an increased risk of developing cardiovascular comorbidity, poorer sleep and rest, more depressive symptoms and diminished social activity (Bookwala, Harralson, & Parmelee, 2003; Davis, 2003; Machado, Gignac, & Badley, 2008; Philbin, Groff, Ries, & Miller, 1995; Reid, Williams, & Thomas, 2003). The symptoms of KOA were also found to affect the client's safety due to the increased risk of falling (Arden et al., 1999), and this leads to further self-restriction of social activities (Wijlhuizen, de Jong, & Hopman-Rock, 2007). On the whole, people with KOA are likely to experience diminished vitality, worse perceived health and poorer quality of life (Bookwala et al., 2003; Briggs, Scott, & Steele, 1999; Jakobsson & Hallberg, 2002). In addition to the symptoms identified above, KOA is also associated with increased use of walking aids and a higher frequency of doctor consultations among elderly Chinese (Woo, Ho, Lau, & Leung, 1994). Moreover, in a study investigating the impact of eight common chronic diseases among adult Chinese people in Hong Kong, it was revealed that KOA increased the risk of sub-optimal overall health and had more impact on the health-related quality of life than other chronic diseases (Lam & Lauder, 2000).

In short, KOA is prevalent among older people, females, the obese and those with a family history of the condition. In addition to the pathological changes, the structural and functional disorders associated with KOA present the sufferer with major symptoms of pain and physical disability. These major symptoms have a profound effect on the person's activity level, physical condition, psychosocial health and quality of life. Such people, therefore, are at risk of long-term suffering and depressing health consequences.

Treatment Modalities for KOA

The primary goals of KOA management are to reduce pain, and to improve physical functioning and the health-related quality of life (Moskowitz et al., 2007; Scott & Kowalczyk, 2007; Zhang et al., 2008). The treatment modalities can be classified into surgical, pharmacological and non-surgical non-pharmacological approaches (Scott & Kowalczyk, 2007; Zhang et al., 2008).

In the case of severe KOA surgical interventions, such as total knee replacement and tibial osteotomy, are considered to be the most clinically effective treatment to reduce knee pain, restore physical function and improve the health-related quality of life (Scott & Kowalczyk, 2007). Surgical intervention in KOA is indicated when the pain relief obtained using a combination of pharmacological and non-surgical non-pharmacological treatments proves inadequate. Tibial osteotomy and joint-preserving surgical procedures are usually used in young adults in order to delay the need for joint replacement (Das & Farooqi, 2008). For older adults, total knee replacement is usually chosen with a view to relieving undue pain and restoring the physical function of the lower extremity (Das & Farooqi, 2008). However, many older adults are not suitable subjects for total knee replacement as they are vulnerable to a number of risks in relation to surgery and general anaesthesia, particularly for those with multiple co-morbidities (Moskowitz et al., 2007). In addition, surgical interventions are costly (Woo et al., 2003).

Pharmacological treatment is targeted at minimizing the pain, to allow maximum mobility (Das & Farooqi, 2008). The principles guiding pharmacological treatment are to use the least toxic medicine at the lowest cost (Das & Farooqi, 2008). The most commonly prescribed medication is simple analgesics such as acetaminophen and non-steroidal anti-inflammatory drugs. Other pharmacological treatment options include nutriceuticals (e.g., glucosamine sulphate) and intra-articular preparations (e.g., intra-articular hyaluronan or steroid injections). Pharmacological treatment does raise some concern arising from the side effects of the medication, especially in older people who often have not only poorer renal functions but also have more than one chronic disease that require treatment by medication (Eliopoulos, 2001; Social Surveys Section, CSD of HKSAR, 2009b). Such a combination of multiple medications is a matter of concern for older people (Eliopoulos, 2001). For example, the effect of simple oral analgesics is short term, but they also carry the risk of unwanted consequences such as gastrointestinal, renal and cardiac adverse effects (Scott & Kowalczyk, 2007).

The common treatment strategies for non-surgical non-pharmacological treatments include education and self-management, exercise, weight reduction, walking aids, knee braces, footwear and insoles, thermal modalities, transcutaneous electrical nerve stimulation (TENS) and acupuncture (Zhang et al., 2008). Education and self-management consist mainly of empowering the clients to make effective use of the various non-surgical treatment modes to manage their KOA themselves. Most of the other non-surgical non-pharmacological treatments mentioned are physical measures. Acupuncture originated in China and is a way of stimulating the body to release endorphins for pain relief (Das & Farooqi, 2008). The non-surgical non-pharmacological treatment options have comparatively fewer side-effects and are widely used by older people with KOA. However, the effectiveness of these treatments varies and for some of them there is still a lack of research evidence to prove that they are effective for KOA (Scott & Kowalczyk, 2007). Exercise has been identified as the most effective non-surgical non-pharmacological treatment, and it will be dealt with in more detail in the next section of this chapter.

According to the recommendations made by the Osteoarthritis Research Society International (Zhang et al., 2008), the optimal management of KOA requires a combination of non-surgical non-pharmacological and pharmacological modalities. Only those people whose OA pain and physical disability cannot be improved by these means should be considered for a surgical intervention.

Exercise

Of all the non-surgical non-pharmacological treatments, exercise offers the strongest evidence of benefits to people with KOA. Exercise can be defined as a range of physical activities involving muscular contraction and repetitive bodily movement that is planned, structured and purposely aimed at improving one or more components of physical fitness (van Baar, Assendelft, Dekker, Oostendorp, & Bijlsma, 1999; Ehrman et al., 2010; Petrella, 2000; Pisters et al., 2007; Taylor, Dodd, Shields, & Bruder, 2007). In general, exercise has consistently demonstrated a small to moderate effect of reducing knee pain and physical disability in people with KOA, at least in the short term (Bosomworth, 2009; Scott & Kowalczyk, 2007; Zhang et al., 2008). The significance of the treatment effect of exercise is similar to that of pharmacological treatment in terms of the reduction of pain (Fransen & McConnell, 2009; Zhang et al., 2008). Moreover, it may have the advantage over pharmacological treatment because it also improves the person's physical functioning and fitness through muscle and cardiopulmonary training (Baker & McAlindon, 2000).

Exercise is considered as a safe treatment in people with KOA; no serious adverse events have been reported in previous reviews of exercise intervention studies (Bosomworth, 2009; Brosseau, MacLeay, Welch, Tugwell, & Wells, 2009; Focht, 2006; Liu & Latham, 2009). Exercise is recommended as the first-line of choice in all clinical practice guidelines for the management of KOA (Misso et al., 2008; Roddy et al., 2005a; Zhang et al., 2008). In addition, the importance of continual undertaking of exercise has been emphasized in these guidelines (Roddy et al., 2005a; Zhang et al., 2008) as the effect of exercise is not sustained after it has been discontinued for a few months (Jamtvedt et al., 2008; Pisters et al., 2007).

The Effect of Exercise and Exercise Adherence

Abundant research has been carried out in other countries on testing and summarizing the effectiveness of exercise interventions for people suffering from KOA (Baker, & McAlindon, 2000; Bartels et al., 2009; Bosomworth, 2009; Brosseau et al., 2009; Devos-Comby, Cronan, & Roesch, 2006; Focht, 2006; Fransen & McConnell, 2009; Lange, Vanwanseele, & Fiatarone Singh, 2008; Pisters et al., 2007; Petrella, 2000; Roddy, Zhang, & Doherty, 2005b). In Hong Kong, in the past 25 years there have been four studies on exercise interventions for people with KOA (Cheing & Hui-Chan, 2002; Cheing & Hui-Chan, 2004; Tsang, 2003; Wong, Hui, & Woo, 2005; Yip et al., 2007a, 2007b; Yip, Sit, Wong, Chong, & Chung, 2008). Overall, both the local and the overseas studies provide evidence to support the beneficial effects of various types of exercise interventions on the health of people with KOA, such as a reduction of knee pain and physical disability. Some of these studies attempted to identify how long the exercise effects would last after the exercise intervention stopped (Deyle et al., 2000; Fransen, Crosbie, & Edmonds, 2001; Iwamoto, Takeda, & Sato, 2007; Pisters et al., 2007). However, the results varied from one study to another as the exercise programmes used in these studies were heterogeneous. The most consistent conclusion reached in these studies, however, was that the exercise effect would eventually disappear if the exercise regimen was discontinued.

Exercise adherence, in this study, is defined as the continual practice of the recommended exercise regimen after the exercise intervention; therefore, is important for maintaining the effects of exercise. Some previous studies on exercise intervention followed up the participants to explore the percentage rate of exercise adherence (Pisters et al., 2007; Penninx et al., 2001; Sullivan, Allegrante, Peterson, Kovar, & MacKenzie, 1998). The findings of these studies suggest that it is common for exercise adherence to decrease over time and there is a positive association between exercise adherence and the exercise effect (e.g., on knee pain or physical function). Most previous studies on KOA have used quantitative approaches to investigate exercise adherence. So far, only one study has adopted a qualitative approach to explore the reasons for non-adherence to the prescription of exercise movements (Campbell et al., 2001). The findings of this study show that the clients' perceptions and experiences of exercise in relation to their values, beliefs, and living context are important factors for achieving an understanding of the barriers they encountered in integrating the exercise movements into their daily routine. Hence, exercise adherence may increase if the exercise programme can be designed to match the clients' perceptions and experiences of exercise. However, most of the exercise programmes used in previous studies was designed on the basis of the perspective of the healthcare professionals. Few studies have taken into account the clients' perceptions and experiences of exercise in the development of the exercise programmes. In addition, there are only a few studies that have dealt with ways of improving exercise adherence for this client group (Jordan, Holden, Mason, & Foster, 2010).

Aim and Significance of the Study

The aim of the present study is, therefore, to develop and pilot an exercise programme for older Chinese people suffering from KOA in Hong Kong by incorporating their perceptions and experiences of exercise into the development process with a view to motivating them to persist in the practice of therapeutic exercise.

This study will contribute to the development of a strategy to deal with the pressing issue of the increasing prevalence of KOA in the expanding population of older Chinese in Hong Kong. In view of the limited number of studies into the use of exercise interventions among older Chinese people with KOA in Hong Kong, an exploratory study on their perceptions and experiences of exercise is necessary to provide a better understanding of the factors that influence their exercise adherence. Developing an exercise programme for this group of people that would encourage them to persist with therapeutic exercise would make an important contribution to improving the quality of their healthcare. In addition, it is an essential step towards improving their quality of life in the long-term. From the economic perspective, the successful development of an exercise programme which could promote continual practice of therapeutic exercises among older Chinese people with KOA is likely to lead to a reduction in healthcare costs, and thus be of benefit also to Hong Kong society at large.

The nature of nursing has been changing over recent decades, with greater emphasis being placed on the nurses' roles in the community setting. In particular, their role in health education and treatment prescription for people with chronic diseases has been expanding (Ellis, 2011). This study, therefore, is also significant for the development of the knowledge base of nursing. The development of the exercise programme it proposes will not only contribute to the nursing care for older people with KOA in nursing practice, but it will also contribute to the knowledge base of nursing research. It will enhance the understanding of factors influencing exercise adherence in older Chinese people with KOA and the knowledge on promoting exercise adherence by means of integrating the client's perspective into the design of an exercise programme.

Conclusion

In summary, the proportion of the older Chinese population is growing in Hong Kong and the prevalence of KOA is also increasing. The cost of healthcare associated with KOA is also a matter of concern from the society point of view. Sufferers from KOA have not only to endure the major symptoms of pain and physical disability, but also to face long-term adverse health consequences for their physical condition, psychosocial health and overall quality of life.

Treatment modalities for KOA include surgical, pharmacological, and non-surgical non-pharmacological treatments. Among the non-surgical non-pharmacological modes of treatment, exercise is recommended as the first-line of treatment for several reasons: it is less costly, it is safe, and there is strong research evidence of its health benefits for people with KOA. However, in the literature it is highlighted that if the health benefits of exercise is to be sustained it is most important that the clients adhere to the exercise treatment. In the light of the research findings in previous studies, exploring the clients' perceptions and experiences of exercise would be the corner stone for the development of an exercise programme that would encourage them to adhere to the prescribed exercise movements. However, few previous studies have incorporated the clients' perspectives into the design of an exercise programme. It has been argued that exercise adherence may increase if the exercise programme is designed to match the clients' perceptions and experiences of exercise. There is only limited material in the literature dealing with ways of improving exercise adherence for people with KOA, and few studies on exercise interventions in this client group in Hong Kong.

The aim of this study, therefore, is to develop and pilot an exercise programme for older Chinese people with KOA in Hong Kong that incorporates their perceptions and experiences of exercise into the development process, with a view to promoting the continual practice of therapeutic exercises among those older Chinese people. The results of this study will be significant for improving the quality of healthcare for this group of clients, limit the costs of healthcare in Hong Kong, and advance the knowledge base concerning the value of exercise adherence. In addition, the results of this study will be significant for nursing practice and research.

Overview of the Thesis

This thesis describes the development and piloting of an exercise programme for older Chinese people with KOA in Hong Kong. It consists of six chapters and the sequence of these chapters is arranged according to the progress of the study. In

Chapter Two the literature relevant to the effectiveness, adherence, and development of exercise programmes is reviewed. Chapter Three provides an overview of the study methods and sets out the links between the Phase I study, development of the exercise programme, and the Phase II study on its implementation and evaluation. Chapter Four contains information about the Phase I study and the development of the exercise programme. The methods used in that study are described and justified, and the findings obtained are presented and discussed. In addition, the implications of the findings of the Phase I study for the development of an exercise programme for the client group are identified, and the process related to the development of the exercise programme is described. Chapter Five deals with the piloting of the newly-developed exercise programme. The methods of the Phase II study are described in relation to evaluation of the newly-developed exercise programme, and the results obtained from the Phase II study are presented and discussed in the light of the study limitations, and the implications are highlighted. Chapter Six presents the conclusions of both the Phase I and Phase II studies and summarises their contributions to the existing knowledge on healthcare.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

This chapter presents a review of the literature for this study. This review identifies the value and effectiveness of exercise in the management of knee osteoarthritis (KOA). It also analyzes and synthesizes previous study findings on exercise interventions for people with KOA. In addition, exercise adherence among people with KOA, and the factors influencing their adherence to the therapeutic exercise recommended by healthcare professionals are explored. Furthermore, the interventions used to promote exercise adherence in people with KOA are also reviewed. The last section is a summary of the literature review and a conclusion of the literature.

Literature Search Strategy

Literature search for this study was conducted on electronic online databases including MEDLINE, CINAHL Plus, All EMB Reviews, Cochrane Library, Clinical Evidence, PsycINFO, PsycArticles, EMBASE, AMED, British Nursing Index, SPORTDiscus, Health Sciences: A SAGE Full-Text Collection, ProQuest Research Library, PubMed National Library of Medicine, Index to Theses, China Journals Full-text, Taiwan Electronic Periodical Services, HyRead, and the University Library Catalogue. Keywords according to MeSH categories including 'osteoarthritis', 'knee', 'exercise therapy', 'adherence', 'compliance', 'concordance', 'perceptions', 'living context', 'living experience', 'health behaviour', 'older', 'Chinese', and 'Hong Kong', were used for searching and the searching was limited to the period from January 1990 to June 2010. Abstracts of the retrieved studies were assessed, and relevant studies were selected for this review; mainly English or Chinese language literature was included. Additional searches were carried out by assessing the reference lists of all the included articles or reports. Appendix 2.1 presents a sample of the search results from electronic online databases.

Osteoarthritis and its Classification

Understanding of osteoarthritis (OA) has advanced in the last several decades. Long ago, OA was considered as a 'wear and tear' problem. However, advancement in understanding of OA has been ongoing. For example, people later discovered that OA should not be viewed as a degenerative joint disease because the cartilage cells are normal and the tissue repairing process is ongoing (Radin & Burr, 1984). In 1986, OA was first defined formally by the American College of Rheumatology (ACR) Diagnostic and Therapeutic Criteria Committee, but the definition still mainly focused on the defective integrity of articular cartilage (Altman et al., 1986). After a proliferation of studies in OA, the latest understanding of OA is reflected by the consensus made in the workshop entitled 'New Horizons in Osteoarthritis' in 1994, and the latest definition of OA was published by the American Academy of Orthopaedic Surgeons in 1995 (Kuettner & Goldberg, 1995). Therefore, OA is currently defined as follows:

'OA is a group of overlapping distinct diseases which may have different aetiologies, but with similar biologic, morphologic, and clinical outcomes. The disease processes not only affect the articular cartilage, but also involve the entire joint, including the subchondral bone, ligaments, capsule, synovial membrane, and periarticular muscles. Ultimately, the articular cartilage degenerates with fibrillation, fissures, ulceration, and full thickness loss of the joint surface. OA diseases are a result of both mechanical and biologic events that destabilize the normal coupling of degradation and synthesis of articular cartilage of chondrocytes and extracellular matrix, and subchondral bone. Although they may be initiated by multiple factors, including genetic, developmental, metabolic, and traumatic, OA tissues involve all the tissues of the diarthrodial joint. Ultimately, OA diseases are manifested by morphologic, biochemical, molecular, and biomechanical changes of both cells and matrix which lead to a softening, fibrillation, ulceration, loss of articular cartilage, sclerosis and eburnation of subchondral bone, osteophytes, and subchondral cysts. When clinically evident, OA diseases are characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of inflammation without systemic effects.' (Keuttner & Goldberg, 1995, p.xxi).

This definition of OA provides a general illustration of the pathological changes, radiographic appearance and clinical consequences of the disease.

Nevertheless, clinical consequences of the disease or symptomatic OA are the main concern. Clinical features form the basis of diagnosis (Bosomworth, 2009; Hunter & Lo, 2008). Findings from radiography are usually taken as a reference to supplement the diagnosis of OA due to the fact that people with radiographic evidence of OA may not have clinical symptoms. For example, a recent systematic review shows that the symptom of knee pain in people with radiographic OA changes of the knee joint varies between 15% and 81% (Bedson & Croft, 2008).

The ACR has proposed criteria for classification of KOA that includes the main symptom (i.e., pain) as the key criterion (Altman et al., 1986; Altman, 1991). Other classification criteria include age, stiffness, crepitus, bony tenderness, bony enlargement, palpable warmth, osteophytes, synovial fluid signs of OA, and blood reports on erythrocyte sedimentation rate and rheumatoid factor. These criteria are revised in 1991 (Altman, 1991). Table 2.1 shows the various sets of criteria being proposed by the ACR for clinical classification of KOA. These criteria are commonly used in clinical practice and research studies of KOA. Sensitivity and specificity information of the classification criteria are also provided; a higher sensitivity yields a higher rate of getting positive cases and a higher specificity yields a higher rate of excluding negative cases of KOA (Portney & Watkins, 2009). The sensitivity and specificity information assist the user in making a choice among the different classification criteria of KOA.

Regarding severity of OA, there are no clear definitions for the various severities. Joint pain and the related physical disability have been commonly used for treatment decisions; in general, clinically active OA ranges from mildly annoying discomfort to severe and disabling pain (Hooper & Moskowitz, 2007).

Table 2.1. ACR criteria for classification of KOA				
Altman et al., 1986 criteria			**Altman et al., 1991 criteria**	
Clinical & Laboratory	**Clinical & Radiographic**	**Clinical***	**Clinical, Laboratory, & Radiographic**	**Clinical**
Knee pain + at least 5 of 9: - Age > 50 years - Stiffness < 30 minutes - Crepitus - Bony tenderness - Bony enlargement - No palpable warmth - ESR < 40 mm/hour - RF < 1:40 - SF OA	Knee pain + at least 1 of 3: - Age > 50 years - Stiffness < 30 minutes - Crepitus + Osteophytes	Knee pain + at least 3 of 6: - Age > 50 years - Stiffness < 30 minutes - Crepitus - Bony tenderness - Bony enlargement - No palpable warmth	Knee pain + - Osteophytes OR - SF OA and - Morning Stiffness ≤ 30 minutes and - Crepitus	Knee pain + - Crepitus and - Morning Stiffness ≤ 30 minutes and - Age ≥ 38 years OR - Crepitus and - Morning Stiffness > 30 minutes and - Bony enlargement OR - No Crepitus and - Bony enlargement
92% sensitivity 75% specificity	91% sensitivity 86% specificity	95% sensitivity 69% specificity	94% sensitivity 88% specificity	89% sensitivity 88% specificity

* Alternative for the clinical category would be knee pain plus 4 out of 6 of the criteria; this alternative yields 84% sensitivity and 89% specificity.

Remarks: ESR = Erythrocyte Sedimentation Rate; RF = Rheumatoid Factor; SF OA = Synovial Fluid signs of OA (clear, viscous, polymorphonuclear leukocytes < 2,000/mm^3).

Role of Muscles in the Genesis and Management of KOA

As pointed out in the latest definition of OA, OA diseases are a result of both mechanical and biologic events that destabilize the normal structure of the joint. The biomechanical changes and the mechanical strains imposed on the internal joint structures are core aetiopathogenetic factors adversely influencing the normal balance of breakdown and synthesis of cells within the synovial joint (Brandt et al., 2008; Poole, Guilak, & Abramson, 2007). OA should not be considered a degenerative joint disease as the cells of the cartilage and bone are normal, and the repairing of tissue damage is ongoing (Brandt et al., 2008; Kawcak, Frisbie, Werpy, Park, & Mcllwraith, 2008; Radin & Burr, 1984). The traditional belief that OA is a 'wear and tear' problem to some extent is incorrect (Bosomworth, 2009), as some studies have demonstrated that the cartilage would increase rather than decrease after regular physical activity (Hanna et al., 2007; Kawcak et al., 2008; Pothier & Allen, 1991; Racunica et al., 2007). Although the cartilage synthesis and breakdown is often aberrant in OA, there is research-based argument on joint healing in OA that the joint will heal if the abnormal joint mechanics can be restored to a normal physiological range (Radin & Burr, 1984).

A main problem of OA, therefore, is the increase of intra-articular pressure to a magnitude higher than the normal physiological loading that results from the internal abnormal joint mechanics and external excessive mechanical loading to the joint (Brandt et al., 2008; Poole et al., 2007). OA represents the failure of the whole synovial joint (Keuttner & Goldberg, 1995); the abnormal joint mechanics extend from articular cartilage to other structures such as the periarticular muscles, nerves, ligaments, meniscus, synovium, and subchondral bone (Poole et al., 2007). The anatomic arrangement of these structures and their capacity to absorb load influence the overall magnitude of joint loading (Bennell, Hunt, Wrigley, Lim, & Hinman, 2008).

At the knee, quadriceps muscles are the most active and powerful shock absorber, despite that other lower limb muscles and soft tissues also contribute to the absorption of knee joint loading (Bennell et al., 2008; Brandt et al., 2008). For example, mechanical stresses on the knee joint during body movements that can be as large as almost 3 times the body weight (Shelburne, Torry, & Pandy, 2006; Taylor, Heller, & Bergmann, 2004), is largely absorbed by the quadriceps muscles (Bennell et al., 2008). The force generates from the contraction of the lower limb muscles, especially quadriceps, which act like large rubber bands that absorb most of the opposing forces generated during heel strikes in various activities, and reduce the intra-articular mechanical load to the knee (Brandt et al., 2008; Hurley, 1999). The actions of the lower limb muscles protect the knee joints from increased intra-articular pressure and also contribute to maintaining stability of the knee during movements (Bennell et al., 2008).

The reduced strength and activation of lower limb muscles, particularly quadriceps, adversely influence the capacity of the muscles to absorb the knee joint loading. Muscle strength (i.e., the ability of the muscle to generate force) is associated with the muscle's cross-sectional area. In general, muscle strength declines with age, and the muscle strength of an older person of 80 years is just about 60% that of a young person 20 years old (Ikeda, Tsumura, & Torisu, 2005). However, some high-quality studies in this area confirm that people with KOA are 20% to 40% relatively weaker in quadriceps strength compared to age-matched healthy controls (Bennell et al., 2008). In addition, quadriceps atrophy (i.e., loss of muscle cross-sectional area) is observed in people with KOA (Fink et al., 2007;

Ikeda et al., 2005; Slemenda et al., 1997; Slemenda et al., 1998). Although muscle atrophy may be a primary cause of muscle weakness in KOA, another concern regarding the function of lower limb muscles is the loss of proprioception. Muscle as an organ of proprioception is responsible for movement and spatial orientation of the body part, and relays the information to the central nervous system; loss of proprioception results in a reduction of muscle activation (Hurley, 1999). Impaired quadriceps proprioception has been confirmed in people with KOA (Sharma et al., 2001) while the related reduction of muscle activation is found related to the knee pain in KOA (Poole et al., 2007). An average reduction of quadriceps muscles activation of 29% has been noted and the range extends from 14% to 59% (Machner et al., 2002).

Therefore, quadriceps training to increase muscle strength and activation by means of exercise has gained particular promotion by clinicians in the management of KOA. This is largely due to the important influence of quadriceps in reducing the knee joint loading which has been considered as a core factor influencing the severity of KOA. Moreover, despite the failure of the various structures in and around the knee, muscle is the only body tissue structure that can be consciously controlled and improved by the person in KOA (Bennell et al., 2008).

Knee Pain and Physical Disability in KOA

Knee pain is the chief complaint in KOA and described by words such as 'aching' and 'throbbing'. Knee pain in KOA may be continuous or exacerbated by activity, and relieved by rest, progressively becoming chronic so that it also presents at rest or during the night (Hooper & Moskowitz, 2007). However, the mechanisms of pain production in KOA remain unclear (Hooper & Moskowitz, 2007). The absence of pain fibres in hyaline cartilage means that metabolic or structural alteration in this tissue is unlikely to be directly perceived (Kidd, 2003). However, there is rich sensory innervation in other joint tissues. For example, knee pain in KOA may be caused by osseous hypertension, subchondral microfractures, or periosteal stretching (O'Reilly & Doherty, 2003). In addition, bursitis, enthesopathy, tendinitis, and ligamentous strain secondary from altered mechanical loading across the knee joint are possible causes to the pain in KOA, while quadriceps weakness also indirectly contributes to the knee pain by increasing mechanical stress to the knee joint (O'Reilly & Doherty, 2003). In addition, knee pain is associated with a number of physical and psychosocial problems, while these problems also aggravate the pain sensation (Axford, Heron, Ross, & Victor, 2008; Ettinger & Afable, 1994). For example, greater pain was associated with reduced coping ability ($N = 170$, -9%, $p < 0.05$), increased depression ($N = 170$, +63%, $p < 0.05$), and reduced physical ability ($N = 170$, -60%, $p < 0.05$) in KOA (Axford et al., 2008).

Physical disability in KOA includes reduced knee range-of-motion (knee ROM), knee instability, poor endurance of lower extremities, and various difficulties in activities of daily living such as walking, stair-climbing, rising up from a sitting position, using a toilet, getting in and out of a bathtub, and putting on and taking off socks (Hooper & Moskowitz, 2007; Jeffreson & Hammond, 2002; Walker, 2009). Physical disability from KOA is associated with knee pain, severity of disease, muscle weakness, and psychosocial factors. Physical disability from KOA is primarily related to the severity of underlying cartilagenous, bony and soft tissue changes and the severity of knee pain (Ettinger & Afable, 1994). However, in logistic regression analysis for physical disability of KOA, radiographic severity of KOA is not a significant predictor of physical disability after the adjustment for knee pain (OR = 1.67), quadriceps strength (OR = 0.84 kgF), and age (OR = 1.06 per year) (McAlindon, Cooper, Kirwan, & Dieppe, 1993). In addition, the results of the study by Axford et al. (2008) showed that physical disability was associated with increased depression (N = 170, -8%, $p < 0.05$), and the experience of more pain (N = 170, -7%, $p < 0.05$). Moreover, in people with knee pain, physical disability was independently associated with quadriceps strength (OR = 0.82 kgF) (O'Reilly, Muir, & Doherty, 1998).

A vicious cycle of knee pain, physical inactivity and disability that mediates by muscle weakness, particularly quadriceps weakness, has been suggested by research evidence to explain physical disability from KOA (Dekker et al., 1992; Dekker, Tola, Aufdemkampe, & Winckers, 1993; Farr et al., 2008; Ling et al., 2003; McAlindon et al., 1993; Steultjens, Dekker, & Bijlsma, 2002). Knee pain is a major reason leading to avoidance of activity among people with KOA. Physical inactivity among people with KOA often results in muscle wasting and weakness in the lower extremities. Muscle wasting and weakness contributes to increased physical disability and also leads to greater knee instability. Greater knee instability contributes to increased mechanical loadings, which adversely affects KOA and results in more knee pain. More knee pain further promotes physical inactivity, finally resulting in greater physical disability among those with KOA.

Therefore, knee pain and physical disability are the two major symptoms affecting people with KOA. A vicious cycle of knee pain, physical inactivity and disability is observed among people with KOA. Quadriceps weakness plays an important role in this vicious cycle to promote physical inactivity and contribute to increase knee pain and physical disability. Quadriceps weakness is amenable to exercise interventions. For instance, quadriceps strengthening exercise can increase quadriceps strength and improve knee stability, contributing to reduced knee pain and enhanced physical functioning of the lower extremities (Millar, 2010). Hence, exercise interventions can be an effective treatment for KOA in terms of breaking down the vicious cycle of knee pain, physical inactivity and disability in KOA. In fact, exercise has been proposed as a mainstay approach for the management of KOA (Misso et al., 2008; Roddy et al., 2005a, Zhang et al., 2008). The next section will give more information about exercise interventions and prescription for people with KOA.

Exercise Interventions and Prescription

Exercise intervention can be defined as a range of physical activities involving muscular contraction and repetitive bodily movement that is planned, structured, and purposely aimed at improving one or more components of physical fitness (van Baar et al., 1999; Ehrman et al., 2010; Petrella, 2000; Pisters et al., 2007; Taylor et al., 2007). Exercise intervention is a general concept that can have many variations such as different modes (e.g. various types of exercise), dosages (e.g. intensity, duration, frequency) and delivery methods (e.g. individualized, class-based, home-based) (Ehrman et al., 2010; Pisters et al., 2007).

Types of exercise can be classified in different ways. Basically, exercise can be classified into aerobic exercise, strengthening exercise, and flexibility exercise. According to Ehrman et al. (2010), aerobic exercise involves the increased consumption of oxygen that is elicited by repeated movements of large muscles. It is primarily used for improving cardiopulmonary function. Strengthening exercise overloads muscles by means of isometric, isotonic or isokinetic muscle contractions and is used for increasing muscle mass and power. Flexibility exercise (either range-of-motion or stretching exercise) moves a joint to its full range for nurturing the joint and maintaining joint flexibility (O'Grady, Fletcher, & Ortiz, 2000). Flexibility exercise is also widely used at warm up and cool down phases of exercise interventions. According to the recommendation of the ACR (2008), Arthritis Foundation (AF) (2008) and several guidelines for people with hip or knee OA (Hochberg et al., 1995; Roddy et al., 2005a; Zhang et al., 2008), aerobic exercise, strengthening exercise and flexibility exercise should be prescribed to people with KOA.

Strengthening exercise can be further classified into isometric, isotonic, or isokinetic exercise (Bandy & Sanders, 2001; Ehrman et al., 2010; O'Grady et al., 2000). According to Ehrman et al. (2010), isometric exercise requires the muscle to contract with the muscle length unchanged; there is no observable movement. In addition, isotonic exercise is one in which the muscle contracts against a constant resistance and movement results, while isokinetic exercise requires the muscle to contract against a variable resistance with the speed of movement being maintained at a constant level. Isokinetic exercise is carried out by using a machine that presets and controls the speed of movement. The drawback of isometric exercise is that increases in strength mainly happen only at the angle at which the muscle was trained (O'Grady et al., 2000). Isotonic or isokinetic exercise allows muscle strength increases at various angles and mimics everyday activities more closely (O'Grady et al., 2000). However, isokinetic exercise is limited in that it requires the assistance of a machine. Strengthening exercise can also be classified as open chain or closed chain exercise; open chain exercise allows the distal segment of the body to move freely in space, while closed chain exercise requires the distal end of the body to remain unmoving (Bandy & Sanders, 2001; Ehrman et al., 2008). Open chain exercise isolates the training to a specific muscle group, while closed chain exercise extends the training to multiple muscle groups that work synergistically. Closed chain exercise more closely corresponds to daily functional activities such as squatting and stair stepping (Baker & McAlindon, 2000). For KOA, strengthening exercise to the thigh muscles, particularly the quadriceps muscles, are prescribed in order to improve knee stability and reduce knee joint loading (O'Grady et al., 2000). In addition, isotonic or isokinetic exercise, as well as closed chain exercise are included in the prescription to enhance the exercise effect on daily functional activities (Baker & McAlindon, 2000; O'Grady et al., 2000).

It is also common to classify exercise into water-based or land-based exercise depending on whether the exercise is performed in water or on land. Other classifications include aerobic and anaerobic exercises, or weight-bearing and non-weight-bearing exercises. Exercise is sometimes classified by the training target, such as balance exercise and proprioceptive neuromuscular facilitation exercise. Special types of exercise such as Tai Chi may consist of a mixture of aerobic, strengthening and flexibility components in the exercise movements. These exercises are also being used in people with KOA, depending on the training target and facilities.

Two major physiologic principles in exercise prescription are principles of overload and specificity (Ehrman et al., 2008; O'Grady et al., 2000). Principle of overload states that repeatedly overloading the physiologic function of a body tissue to a level beyond its threshold is necessary in order to elicit an adaptation process for expanding the physiologic capacity (Ehrman et al., 2008; O'Grady et al., 2000). Principle of specificity implies that improvements in specific physiologic capacities depend on whether they are being specifically stressed in the course of training

(Ehrman et al., 2008; O'Grady et al., 2000). Therefore, in exercise prescriptions, mode of exercise should be guided by principle of specificity, while dosage of exercise should follow principle of overload. Dosage of an exercise intervention is adjusted by intensity, duration, and frequency (Ehrman et al., 2008; O'Grady et al., 2000). Intensity is the amount of effort required during the training in terms of percentage of the individual's maximal capacity. Duration is the amount of time engaged in the training in aerobic exercise, or the number of sets and the number of repetitions per set in muscle-strengthening exercise. Frequency is the number of exercise sessions per week. By manipulating intensity, duration, and frequency, exercise interventions can be designed to various dosages and various ways to fit the need of the individuals. Therefore, various designs of exercise intervention are used in the exercise prescription for people with KOA depending on their needs, while the principles of overload and specificity shall be applied in all the exercise prescription.

Other considerations in exercise prescription include progression and prioritization. Progression refers to progressively overloading the physiologic function of a body tissue by continually increasing the exercise demands (Ehrman et al., 2008). This is achieved by adjusting the intensity, duration, and/or frequency and depends on the short-term and long-term goals of the exercise intervention. Prioritization emphasizes initially addressing the specific impairments that contribute to the functional deficits, and then later expanding to improve overall physical fitness and independence (O'Grady et al., 2000). In KOA, priority of exercise prescription should be given to regain the client's knee flexibility and muscle strength, as these impairments are the primary causes of difficulties in physical functioning. After the client has shown a certain degree of improvement in lower limb functioning, additional exercise prescription should be given to improve the client's aerobic capacity.

Effects of Exercise Intervention in People with KOA

Abundant research has been carried out on testing and summarizing the effectiveness of exercise interventions for people with KOA. There were 12 review papers (i.e., 2 review of systematic reviews, 6 systematic reviews and 4 literature reviews) summarizing the findings of 56 different interventional studies related to exercise interventions in people with KOA, and an additional 15 studies not included in the reviews. Two of these papers were reviews of systematic reviews (Bosomworth, 2009; Jamtvedt et al., 2008). The majority of these studies were carried out on middle age and older people (≥ 50 years) with KOA or combined hip and knee OA; one review (Focht, 2006) and approximately one-fourth of these exercise intervention studies were carried out with older people (≥ 60 years) with KOA. However, only four exercise intervention studies for people with KOA were conducted in Hong Kong (Cheing et al., 2002; Cheing & Hui-Chan, 2004; Tsang, 2003; Wong, Hui, & Woo, 2005; Yip et al., 2007a, 2007b).

The major symptoms concerning people with KOA are knee pain and physical disability; thus the effect of exercise intervention is most commonly evaluated against these two major symptoms. Outcome measurements of knee pain that are commonly found in previous studies include the visual analogue scale (VAS) of pain or the pain subscale in the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) or the Arthritis Impact Measurement Scales (AIMS). Outcome measurements of physical disability that are commonly used in previous studies include the physical functioning subscale in the WOMAC or the AIMS.

These outcome measures are self-reported scales. Physical performance tests such as the timed-stand test, the six minutes walking distance, and the stair-climbing speed are sometimes used as outcome measures in previous studies to supplement the subjective data on physical functioning. In addition, the WOMAC or AIMS as a whole is an outcome measure of disease-specific quality of life for people with KOA. Some studies may also include an outcome measure on generic quality of life; for example, the 36-item Short Form of the Medical Outcome Study Questionnaire (SF-36) is an instrument used in previous studies in people with KOA.

Exercise Effects on Knee Pain and Physical Disability

Exercise interventions are in general effective on reduction of knee pain and physical disability in people with KOA, and the overall beneficial effects are both small to moderate at least in the short-term (i.e., < 6 months after the exercise intervention) (Bartels et al., 2009; Bosomworth, 2009; Brosseau et al., 2009; Devos-Comby et al., 2006; Focht, 2006; Fransen & McConnell, 2009; Lange et al., 2008; Liu & Latham, 2009; Pisters et al., 2007; Roddy et al., 2005b).

Various types of low to moderate level exercise interventions uniformly show some benefits to reduction of knee pain and/or physical disability in people with KOA. These exercise interventions include aerobic exercise such as walking and cycling, strengthening exercise such as progressive resistance training, quadriceps strengthening exercise, isokinetic exercise, isotonic exercise, isometric exercise, and closed kinetic chain exercise, flexibility exercise such as stretching, land-based exercise, water-based exercise, weight-bearing exercise, non-weight-bearing exercise, balance exercise, and proprioceptive training.

For example, Bosomworth (2009) has reviewed 9 high-quality systematic reviews between 2000 and 2008, and concluded that there is outstanding evidence for the benefit of exercise intervention for reduction of both knee pain and physical disability in KOA. Bosomworth (2009) has also commented that the level of exercise interventions was mostly low to moderate, and the benefits from exercise interventions were mainly short-term. Long-term benefit was not demonstrated (Bosomworth, 2009; Pisters et al., 2007). Regarding the risk in progression of KOA, Bosomworth (2009) affirms that low to moderate intensity exercise will not cause increased pain or disability in KOA. Hence, low to moderate exercise interventions in general are safe for people with KOA, and the benefits will be sustained if the person with KOA continues to exercise.

Nevertheless, Bosomworth's (2009) clinical review has included various types of exercise interventions, and secondary information has mainly been used to make descriptive conclusions. Bosomworth (2009) contributes to provide a general overview of the latest research evidence on exercise interventions in KOA.

The following section will specifically review the effectiveness of exercise interventions on reduction of knee pain and physical disability for people with KOA in terms of different types of exercise. It will start with a broad review and comparison between land-based and water-based exercise. It will then focus on muscle-strengthening exercise which has the greatest number of studies in KOA due to it is the most important type of exercise for KOA. In addition, the effectiveness of aerobic exercise will be reviewed as it is generally prescribed to people with chronic diseases for improving physical fitness. Lastly, Tai Chi as a popular exercise in the Chinese population will be reviewed.

Land-based Exercise

Regarding synthesizing the treatment benefit of land-based exercise in people with KOA, Fransen & McConnell have continued their effort in carrying out Cochrane systematic reviews, and pooled 32 randomized controlled trials (RCTs) that provided data for almost 3800 participants in 2009. They revealed a small beneficial treatment effect of land-based exercise for both pain (SMD = 0.40, 95% CI = 0.30-0.50) and physical function (SMD = 0.37, 95% CI = 0.25-0.49) in people with KOA. Some land-based exercise intervention studies in people with KOA have been published since this systematic review. The findings of these studies (Jenkinson et al., 2009; Kawasaki et al., 2008; Lin, Lin, Lin, & Jan, 2009; Rattanachaiyanont & Kuptniratsaikul, 2008; Stitik et al., 2007; Weng et al., 2009) further support the results from the review of Fransen & McConnell (2009).

While these findings were obtained from the outcomes immediately after completion of the exercise programme, they are applicable to short term benefits of land-based exercise for KOA. However, the review participants were mainly mild cases, which might reduce the potential range of improvement due to ceiling effect in the measurements and thus might obscure the maximum effect of the exercise intervention (Fransen & McConnell, 2009). Moreover, many exercise intervention studies in KOA limited the outcome measures to self-reported pain and physical function; objective outcome measures are suggested to enhance the methodological quality.

Land-based exercise - characteristics of the intervention

Fransen & McConnell (2009) attempted to conduct sensitivity analyses to the characteristics of the exercise interventions. However, there was marked heterogeneity between the content of the evaluated exercise programmes. For example, the frequency of monitored exercise sessions ranged from none to more than 36 sessions and the duration of these sessions ranged from 30 minutes to 90 minutes, while treatment period ranged from 1 month to 2 years. Fransen & McConnell (2009) can only crudely perform subgroup analyses using a cut-off of 12 direct supervision occasions and mode of treatment delivery. They found that exercise programmes providing fewer than 12 direct supervision occasions demonstrated small mean effect sizes while those programmes providing 12 or more direct supervision occasions showed moderate mean effect sizes for knee pain and physical disability. However, these results should be read with cautious. The use of 12 sessions is arbitrary; more importantly, many factors were influencing the intervention effect in addition to direct supervision occasions.

Land-based exercise - mode of delivery

Fransen & McConnell (2009) also compared the mode of treatment delivery and found that individual treatments, exercise classes, and home programmes did not demonstrate significant differences in the treatment benefits as measured by knee pain and physical disability. However, the mode of treatment delivery cannot be clearly differentiated, as many home programmes included visits by a trained nurse or community physiotherapist, while most of the individual or class-based treatments included a component of home exercise programme (Fransen & McConnell, 2009). Therefore, these findings are exploratory.

Land-based exercise - dosage

Treatment dosage is a key element influencing the effectiveness of exercise interventions; Fransen & McConnell (2009) discussed the fact that none of the studies included in their review attempted to evaluate the influence of exercise dosage. There are 2 studies in KOA, so far, comparing exercise intensity (Brosseau et al., 2009; Jan, Lin, Liau, Lin, & Lin, 2008; Mangione et al., 1999). Mangione et al. (1999) compared the effect of high intensity with low intensity stationary cycling in 39 older people with KOA and concluded that both high intensity and low intensity aerobic exercise appeared to be equally effective in improving the adult's functional status, gait, pain, and aerobic capacity. Another study conducted by Jan et al. (2008) compared the effect of high-resistance with low-resistance training using an 8-week resistance training programme in 102 people with KOA. They found that both high-resistance and low-resistance training significantly improved the client's pain, physical function, walking time, and muscle strength with no significant difference between the results of the high-resistance and low-resistance training groups. The results of these two studies (Jan et al., 2008; Mangione et al., 1999) show short-term benefits obtained immediately after the exercise interventions. Yet, a fundamental question regarding the negative results obtained from these 2 studies is how much difference in the treatment dosage was induced in the studies for testing dosage effect between the 2 comparison groups. Another related question is whether the older clients are capable or willing to accept a high-dose exercise programme.

Water-based Exercise

Bartels et al. (2009) conducted a Cochrane systematic review on the effectiveness of water-based exercise interventions in the treatment of hip and knee

OA. They found that the number of intervention studies for testing the effect of water-based exercise interventions in hip or knee OA is much less than the number of studies for testing the effect of land-based exercise interventions. Bartels et al. (2009) identified 6 clinical trials (800 participants) from previous literature and commented that there was a lack of high-quality water-based exercise interventional study in hip or knee OA. Bartels et al. (2009) concluded that there was only a minor effect (SMD = 0.19, 95% CI = 0.04-0.35) on reduction of pain, and a small-to-moderate effect on improving physical function (SMD = 0.26, 95% CI = 0.11-0.42). Bartels et al. (2009) also emphasized that the effect of water-based exercise interventions in hip or knee OA was limited to short term, because only one of the included studies (Cochrane, Davey, & Edwards, 2005) had a follow-up at 6 months and the post-intervention effects of this study had become insignificant at the follow-up session.

Comparisons between Land-based and Water-based Exercise

A few recent exercise intervention studies in KOA comparing land-based with water-based exercise found both types of exercise were in general similarly effective in reduction of knee pain and physical disability (Gill, McBurney, & Schulz, 2009; Silva et al., 2008) except that the water-based exercise group had less pain immediately after the exercise class (Gill et al., 2009). Nevertheless, Lund et al. (2008) failed to find any significant exercise effect on reduction of knee pain or physical disability after the exercise interventions in both land-based and water-based exercise groups. At three months after, significant reduction of knee pain and some improvements in muscle strength were only observed in the land-based exercise group but not in the water-based exercise group. The negative results in the study of Lund et al. (2008) are inconsistent with most of the study findings in land-based and water-based exercise interventions; it may be related to the small sample size (27 subjects in each group) or the low dosage of prescribed exercise.

On the whole, the existing research evidence supports the benefits of land-based or water-based exercise in people with KOA; research in land-based exercise is more substantial.

Muscle-strengthening Exercise

More exercise intervention studies have examined the effects of muscle-strengthening exercise in people with KOA than of any other types of exercise. This may be because muscle weakness is a key problem contributing to the vicious cycle of pain, inactivity and disability in KOA (Bennell et al., 2008; Brandt et al., 2008). Previous studies of KOA have investigated various types of muscle-strengthening exercise including progressive resistance training, quadriceps strengthening exercise, isokinetic exercise, isotonic exercise, isometric exercise, and closed kinetic chain exercise.

Muscle-strengthening exercise – with progressive element

The effects of progressive resistance training have been summarized by Liu & Latham (2009) in older people using data from 121 RCTs (6,700 participants). They included 6 RCTs, which provided data on 503 participants in hip or knee OA. Liu & Latham (2009) reported that participants with hip or knee OA reported a small effect (SMD = -0.30, 95% CI = -0.48 to -0.13) on reduction of knee pain after progressive resistance strength training. In general, progressive resistance strength training has demonstrated large positive effect sizes on muscle strength (SMD = 0.84, 95% CI = 0.67 to 1.00) and the timed-stand test (SMD = -0.94, 95% CI = -1.49 to -0.38) in older people. However, the effect sizes on health outcomes demonstrated by progressive resistance strength training were larger in healthy older adults when it was compared with older adults with functional limitations (Liu & Latham, 2009). The difference in effect sizes might partly relate to the intensity of training, because almost all the programmes that included older adults with functional limitations were limited to low to moderate intensity. Liu & Latham (2009) pointed out that there was insufficient evidence to comment on the long-term effects of progressive resistance strength training. In addition, there was inadequate data to guide the dose and prescription of progressive resistance strength training (Liu & Latham, 2009).

Muscle-strengthening exercise – without progressive element

Liu & Latham (2009) had focused on resistance strength training with a progressive element, while without that progressive element resistance strength training was still effective on reducing knee pain and physical disability in older people with KOA as demonstrated in the findings of previous systematic reviews (Focht 2006; Lange et al., 2008; Roddy et al., 2005b) and some later published studies (Iwamoto et al., 2007; Jenkinson et al., 2009; Lin, Lin, Chai, Han, & Jan, 2007; Lin et al., 2009; Weng et al., 2009). For instance, Roddy et al. (2005b) reported that the effect size for knee pain by pooling data from 2004 people with KOA for home-based quadriceps strengthening exercise was 0.39 (95% CI = 0.23 – 0.42) and the effect size for self-reported physical disability was 0.32 (95% CI = 0.23 – 0.41).

However, Focht (2006) reviewed 9 muscle-strengthening trials in older people with KOA, and noted a considerable variability in the magnitude of pain improvement between intervention and control groups (ranging from small to moderate to large effect sizes) and also in pain reduction from baseline in the strength training group (12% to 38%). The variability of effect sizes between studies might be related to the variations in types, dosages, and delivery methods of strengthening exercise, or attendance and adherence of the intervention of the included studies. Moreover, the variability might also have partially resulted from the use of different measures of pain symptoms across trials (Focht, 2006).

Comparisons between different types of muscle-strengthening exercise

Regarding various types of muscle-strengthening exercise, Focht (2006) reported that isokinetic exercise (65%) yielded a greater improvement in knee pain when compared with isometric exercise (32%) in older people with KOA. In addition, Huang, Lin, Yang, & Lee (2003) compared isokinetic exercise, isotonic exercise and isometric exercise against no exercise in people with KOA. They reported that all the exercise groups demonstrated significant improvements in self-reported pain and self-reported physical disability after treatment and at one year follow-up. However, the significant improvement in walking speed found in isokinetic and isotonic exercise groups was not demonstrated in the isometric exercise or control groups. Between the 3 exercise groups, isotonic exercise had the greatest effect on pain reduction after treatment and the lowest attrition rate (Huang et al., 2003). In addition, Jan, Lin, Lin, Lin, & Lin, (2009) recently compared the effect of weight-bearing and non-weight-bearing types of strengthening exercise using an 8-week exercise programme, and concluded that the two types of strengthening exercise resulted in similarly significant improvements in physical function as measured by the WOMAC physical function subscale, walking speed, and muscle torque in people with KOA; the exception was that the weight-bearing exercise group showed a significantly greater improvement in knee reposition error.

Aerobic Exercise

Low-impact aerobic exercise is recommended to people with KOA for improving aerobic capacity (ACR, 2008; AF, 2008). Focht (2006) reviewed two studies on aerobic exercise in older people with KOA and found that both walking (Effect Size = 0.74) and high-intensity stationary cycling (Effect Size = 0.63) were similarly effective in improving knee pain. Therefore, he suggested that both weight-bearing and non-weight-bearing types of aerobic exercise could yield benefits for reducing knee pain in KOA. In addition, Roddy et al. (2005b) reported that the effect size for knee pain by pooling data from 449 subjects for aerobic walking was 0.52 (95% CI = 0.34 – 0.70) while the effect size for self-report physical disability was 0.46 (95% CI = 0.25 – 0.67).

Tai Chi

Tai Chi as a special form of land-based exercise originated in China and may be more commonly practiced among people with KOA in Hong Kong. Tai Chi has been studied in people with OA and there is a systematic review conducted by Lee, Pittler, & Ernst (2008) to evaluate the effectiveness of Tai Chi for treating OA. Lee et al. (2008) have included 5 RCTs and 7 non-randomized clinical trials (CCTs) that covered the period from 2000 to mid-2007 in their review. However, only 6 (4 RCTs and 2 CCTs) out of the 12 trials are studies focusing on hip or knee OA; the other 6 studies focus either on multiple joints or did not report the site of OA. There were contradictory findings among these 6 trials. While 3 studies reported significant improvement in pain, the other 3 studies failed to obtain a significant result (Lee et al., 2008). Similarly, 3 studies reported significant improvement in physical function, but 2 studies reported no significant improvement. One study reported no improvement in joint flexibility, but a significant finding in improvement of balance. On the whole, the effect of Tai Chi in KOA is inconclusive (Lee et al., 2008).

Comparisons between Different Types of Exercise

Some studies have made comparisons between different types of exercise in people with KOA. Lin et al. (2007) compared weight-bearing computerized proprioception facilitation exercise with weight-bearing closed kinetic chain exercise in people with KOA. They found that both types of exercise were effective in improving joint position sense, functional score, walking speed, and muscle strength, while closed kinetic chain exercise showed a greater effect in increasing knee extensor torque in people with KOA. Later, Lin et al. (2009) also compared the efficacy of non-weight-bearing proprioception facilitation exercise with non-weight-bearing strengthening exercise in people with KOA. They found that both proprioception facilitation exercise and strengthening exercise improved the WOMAC pain and functional scores, with the proprioception facilitation exercise group demonstrating greater improvement in walking time on spongy surface and knee reposition error. The findings from these 2 studies were obtained immediately after the interventions thus supporting the short-term effect of the exercise. Moreover, these findings are also consistent with the principle of specificity for exercise training, as strengthening exercise demonstrated a greater improvement in muscle strength while proprioception facilitation exercise yielded a greater improvement in proprioception measures.

Another study carried out by Chaipinyo & Karoonsupcharoen (2009) compared home-based balance exercise with muscle-strengthening exercise in people with KOA. The results did not review significant between-group difference in pain reduction or muscle strength, except that the muscle-strengthening exercise group had significantly taken shorter time for walking downstairs as compared to the balance exercise group.

Comparisons of muscle-strengthening exercise in combination with other types of exercise have also been studied. Weng et al. (2009) conducted a 4-arm RCT in 132 people with bilateral KOA. The 4 groups were isokinetic exercise only, isokinetic exercise combined with static stretching, isokinetic exercise combined with proprioceptive neuromuscular facilitation stretching, and no exercise. The results showed that all the exercise groups significantly improved knee pain, physical disability and muscle strength post-intervention and at one-year follow up, but isokinetic exercise only was not as effective as combining isokinetic exercise with stretching techniques on improving joint flexibility and muscle strength at some angles. The control group did not show significant improvements in any of the outcome measures. Therefore, although muscle-strengthening exercise is important for people with KOA, muscle-strengthening exercise alone is not as effective as it combines with stretching exercise.

In summary, small to moderate exercise effects on reduction of knee pain and physical disability in people with KOA are demonstrated by the results of previous studies. The exercise interventions in these previous studies are mainly low to moderate level, and safe for people with KOA. Land-based exercise has shown more substantial research evidence than water-based exercise in its effects on reduction of knee pain and physical disability in the client group. Different types of muscle-strengthening exercise have demonstrated their effects on reducing the symptoms of KOA. In addition, isotonic exercise has demonstrated better effects in reduction of knee pain than isokinetic or isometric exercise, while the effects on muscle strength and physical function between weight-bearing and non-weight-bearing strengthening exercise were comparable. Aerobic exercise has demonstrated positive effects on reduction of knee pain and physical disability in people with KOA. However, the effect of Tai Chi in KOA is inconclusive. Some studies have compared the effect of different types of exercise in people with KOA. The results of these comparisons mainly support the effects of exercise in reducing knee pain and physical disability in people with KOA, while combining flexibility and muscle-strengthening exercise had better effects than muscle-strengthening exercise alone. Nevertheless, the effects of exercise on pain reduction and physical function improvement in people with KOA are mainly short-term. Long-term effects have not been well studied. In addition, considerable heterogeneity in terms of duration, frequency, dosage and mode of delivery was noted in previous studies. This posits difficulties in data synthesis and identification of optimal exercise dosage and design for people with KOA.

Exercise Effects on Other Health Outcomes

In addition to knee pain and physical disability, exercise interventions also demonstrated benefits on other health outcome measures in people with KOA. The effect of exercise interventions on improving generic quality of life was inconsistent in previous studies (Baker et al., 2001; Bennell et al., 2005; Chaipinyo & Karoonsupcharoen, 2009; Foley, Halbert, Hewitt, & Crotty, 2003; Fransen et al., 2001; Jenkinson et al., 2009; Rattanachaiyanont & Kuptniratsaikul, 2008; Thomas et al., 2002; Thorstensson, Roos, Petersson, & Ekdahl, 2005; Tsang, 2003; Wong et al., 2005). For instance, Foley et al. (2003) noted a significant improvement in the mental health summary score of the 12-item Short Form of the Medical Outcome Study Questionnaire (SF-12) but not in the physical health summary score after the exercise intervention. Wong et al. (2005) found that the exercise intervention could significantly improve the SF-36 physical functioning and bodily pain subscale scores but not in the other domains of the SF-36. Baker et al. (2001) could not find a significant improvement in the SF-36 bodily pain subscale score but noted a significant improvement in the SF-36 physical functioning, role physical, social functioning and mental health subscale scores. Thus the effect of exercise intervention on general health status is inconclusive.

Regarding the benefit of exercise in affecting structure deficit of KOA, Hanna et al. (2007) found two-week aerobic exercise participation at an intensity that caused tachypnea and an increased pulse rate for 20 or more minutes was associated with increased volume of the medial tibial cartilage. Clinical or radiologic disease severity was also reported in some studies of strength training, but the findings were inconsistent, ranging from significant improvement to non-significant improvement to no change (Baker et al., 2001; Ettinger et al., 1997, Mikesky et al., 2006; Maurer, Stern, Kinossian, Cook, & Schumacher, 1999).

For the psychological aspect, some studies reported decreased depression and anxiety (Minor, Hewett, Webel, Anderson, & Kay, 1989; Westby, 2001), and decreased fatigue (Westby, 2001) after aerobic exercise interventions in people with arthritis. However, the meta-analysis of Devos-Comby et al. (2006) concluded that exercise and self-management interventions could improve psychological outcomes (as measured by hospital anxiety and depression scale, AIMS subscale, or the SF-36 mental health subscale) and the effect size was small (0.20, 95% CI = 0.08 – 0.33). However, Lange et al. (2008) noted that the effect of strength training on depression was inconsistent among 6 included studies. Therefore, the effect of exercise interventions on psychological outcomes is yet to be confirmed.

With respect to the risk of falls in older people with arthritis, Williams, Brand, Hill, Hunt, & Moran (2010) piloted a 4-month home-based balance exercise programme in 39 female volunteers with lower-limb OA or lower-limb rheumatoid arthritis (RA) and found significant improvements in fall risk, activity levels, fear of falling, functional reach test, rising index for sit to stand, step width in walking and body mass index.

Rejeski, Ettinger, Martin, & Morgan (1998) found that both aerobic and resistance exercise interventions could increase self-efficacy for stair climbing in older people with KOA but this was not observed in the health education control group. Rejeski et al. (1998) also found that both knee pain and self-efficacy mediated the effect of the treatments on stair climb time, whereas only knee pain mediated health perceptions. Rejeski et al. (1998) discussed how exercise interventions could increase performance-related self-efficacy beliefs, which in combination with reduction of knee pain, enhance the exercise effects on the clients.

Therefore, exercise effects on generic quality of life, structural deficits, psychological outcomes, risk of falls and performance-related self-efficacy beliefs are briefly reviewed. The majority of findings in these health outcomes are inconclusive.

Exercise Intervention Studies in People with KOA in Hong Kong

A total of four studies published during the period 2002-2008 have examined exercise interventions in people with KOA in Hong Kong. The first study focused on testing the effect of transcutaneous electrical nerve stimulation (TENS) and isometric exercise on pain relief in middle-aged or older people with KOA (Cheing et al., 2002; Cheing & Hui-Chan, 2004). Another study, carried out by Tsang (2003), intended to test the effectiveness of a community nurse-led protocol in frail older people with KOA. The third study was carried out by Wong et al. (2005) and the main purpose of the study was to explore the feasibility and efficacy of delivering exercise programmes to elderly people with KOA by video-conferencing techniques. The latest study was conducted by Yip and her colleagues (2007a, 2007b) and the aim of the study was to assess the effect of an adopted Arthritis Self-Management Programme (ASMP) (adopted from Lorig & Fries, 2000) with an added Tai Chi exercise component for people with KOA. Yip and her colleagues (2008) also conducted a follow up study of the participants focusing on the exercise effect at 12 months. Therefore, the focuses of these studies are different from each other.

The exercise interventions of these studies included isometric exercise to be performed by using an exercise machine (Cheing et al., 2002; Cheing & Hui-Chan, 2004), a set of home exercises adopted from Ellert (1990) (Tsang, 2003), a set of home exercises developed by the physiotherapists (Wong et al., 2005), and a combination of stretching, walking and Tai Chi movements (Yip et al., 2007a, 2007b). The exercise interventions used in these studies are heterogeneous but all of them are developed by healthcare professionals. These exercise interventions were delivered by physiotherapists or nurses.

The majority of these studies are short-term evaluations of the exercise interventions. The study of Cheing et al. (2002) followed up the participants to 4 weeks after the intervention. The studies of Tsang (2003) and Wong et al. (2005) did not follow up the participants after the intervention. Only one study followed up the participants to 12 months (Yip et al., 2008).

The outcome measurements of these studies were different with regard to the respective study purpose and the results were inconsistent. Cheing et al. (2002) used self-reported VAS on knee pain as the only outcome measure. They reported a significant reduction of knee pain post-intervention but this significant change did not sustain at 4 weeks after the intervention. Another study (Wong et al., 2005) demonstrated significant improvements in all the study outcomes including self-reported symptoms of KOA and objective measures of physical function. The other two studies (Tsang, 2003; Yip et al., 2007a, 2007b) found significant improvements in the majority of self-reported outcome measures but could not find any significant improvement in objective measures of physical function. These inconsistent results could be related to the heterogeneity in the design of the exercise intervention.

With regard to methodological limitations, the studies of Cheing et al. (2002) and Tsang (2003) share the problems of small sample size ($N \leq 19$ in each group) and lack of allocation concealments. The study of Wong et al. (2005) has no control group and the sample size is small ($N = 22$). The study of Yip et al. (2007a, 2007b) has the problem of lack of allocation concealments and the post-test which used a face-to-face data collection method may suffer the problem from inviting social desirable answers. In addition, this study has high attrition rates post-intervention (34%) and at one-year follow up (47.8%).

Therefore, only a few exercise intervention studies in people with KOA in Hong Kong. The exercise interventions used in these local studies are mainly developed by healthcare professionals. The majority of these studies are short-term evaluations of the exercise interventions and have various methodological limitations. The studies of Tsang (2003) and Yip et al. (2007a, 2007b) showed that nurses can play an important role in providing exercise programmes to people with KOA.

Exercise Adherence in People with KOA

Exercise adherence is important for the long-term therapeutic effect of exercise interventions. The therapeutic effect of exercise interventions in people with KOA has, to a great extent, been confirmed by previous studies. Therapeutic exercise, therefore, is recommended in several multi-disciplinary treatment guidelines that have incorporated research-based evidence and expert consensus for people with hip or knee OA (Misso et al., 2008; Roddy et al., 2005a; Zhang et al., 2008). These guidelines also consistently emphasize the need to promote long-term exercise adherence in people with hip or knee OA. Although the effect of some exercise might last longer than that of another, exercise adherence is important because the effect of therapeutic exercise will decline after it has been discontinued, and eventually it will disappear (Deyle et al., 2000; Fransen et al., 2001; Iwamoto et al., 2007; Pisters et al., 2007; Pisters et al., 2010). A lack of regular exercise will lead to functional decline and the related psychosocial adverse effects in people with KOA (Pisters et al., 2007; Ettinger et al., 1997; Steultjens et al., 2002; Sullivan et al., 1998). On the other hand, higher exercise adherence is associated with reduction of knee pain and improved physical functioning in people with KOA (van Gool et al., 2005; Hurley et al., 2007; Huang et al., 2003; Lange et al., 2008; Pisters et al., 2010; Thomas et al., 2002). For instance, Thomas et al. (2002) have reported that the effect sizes for knee pain reduction were 0.42, 0.34, and 0.16 for participants with exercise adherence at high, medium, and low, respectively. Therefore, exercise adherence is important for enhancing the long-term effect of exercise in people with KOA so as to promote the physical and psychosocial health of them.

Measurements of Exercise Adherence

Adherence is defined by the World Health Organization as 'the extent to which a person's behaviour corresponds with agreed recommendations from a health care provider' (Sabate, 2003). With regard to exercise adherence, successful exercise adherence requires the client's continual practice of the recommended exercise regimen after the exercise intervention.

However, less than one-third of previous exercise intervention studies in people with KOA have measured exercise adherence and there are variations in the measurement method and duration. In the literature concerning exercise interventions in people with KOA, about half of the studies have not reported exercise attendance or adherence of the participants. Some studies have reported only the participants' attendance at exercise sessions (Kupniratsikul, Tosayanonda, Nilganuwong, & Thamalikitkui, 2002; Messier et al., 2000; Mangione et al., 1999; Thorstensson et al., 2005; Huang et al., 2003; Peloquin, Bravo, Gauthier, Lacombe, & Billiard, 1999; Rogind et al., 1998; Wilder, Barrett, & Farina, 2006). Less than one-third of the previous studies have provided more information about exercise adherence and most of these studies reported exercise adherence in terms of percentage of the recommended frequency. However, the precision of measurements in terms of frequency could have variations. The average percentage of exercise adherence is reported at a range from 30.1% to 86%. A few studies used other measurements for exercise adherence (Hughes et al., 2004; McCarthy et al., 2004; Schoo, Morris, & Bui, 2005a; Pisters et al., 2010; Talbot, Gaines, Huynh, & Metter, 2003; Tsang, 2003; Yip et al., 2007a). With regard to the duration of measurement, exercise adherence has been measured for a range from 6 weeks to 5 years in previous exercise intervention studies in people with KOA.

There are variations in the measurements of exercise adherence in terms of percentage of the recommended frequency. Quite a number of the studies employed an exercise diary to measure frequency of exercise adherence, and relied on self-report of the participants (Baker et al., 2001; Deyle et al., 2000; Ettinger et al., 1997; Messier et al., 2004; O'Reilly, Muir, & Doherty, 1999; Ravaud et al., 2004; Shakoor, Furmanov, Nelson, Li, & Block, 2008; Thomas et al., 2002; Tsang, 2003; Wong et al., 2005). The precision of measurement in the exercise diary varied from dates to the number of each exercise movement in the exercise regimen. A higher precision could provide more information about exercise adherence; however, the participant's ability and willingness to do the exercise diary should be considered in the design of an exercise diary.

With regard to other methods for measuring exercise adherence, two studies used an exercise diary in terms of time engaged in exercise (Hughes et al., 2004; Yip et al., 2007a) in which a percentage was calculated by dividing the actual time engaged in exercise by the expected time. One study measured exercise adherence by asking the participants to recall and estimate their walking distances per week (Sullivan et al., 1998). A few studies developed a questionnaire for measuring exercise adherence. For example, Pisters et al. (2010) used a single-item 5-point Likert scale to measure exercise adherence. In addition, McCarthy et al. (2004) used a Likert scale adherence questionnaire consisting of a few questions about frequency and duration of exercise, and overall amount of physical activity level for measurement of exercise adherence. Moreover, in the study of Schoo et al. (2005a), exercise adherence was measured by recording the exercise time on the day, the duration of the exercise routine, and checking a single-item 3-point Likert scale. Using questionnaires for measurement of exercise adherence has the advantage of reducing the recording load of the participants. However, the exercise adherence information is less refined compared to that obtained by an exercise diary; it requires the judgement of the participant and may have recall bias.

Objective measurement or professional judgement was included in a few studies to enrich the understanding of exercise adherence. The study of Talbot et al. (2003) measured daily physical activity by accelerometers, and also used pedometers for comparing the number of steps recorded on the daily pedometer log with the weekly step goal. Two studies employed professionally judged measurement that assessed the correctness of exercise performed by the participants (Schoo et al., 2005a; Tsang, 2003). Tsang (2003) reported that only 10.53% of the participants could perform all the exercise skills correctly; however, he did not report the method for making the professionally judged measurement. Schoo et al. (2005a) reported that the Correctness of Exercise Performance (COEP) scale was used for assessing the home exercise performance and the exercise performance was judged according to three criteria: 'the performance has been carried out so well that the goal of the exercise is reached', 'the exercise is not performed correctly and the goal is not reached', and 'the exercise is carried out incorrectly, the goal is not reached and there is reason to assume that the exercise causes harm'. Participants who performed an exercise incorrectly were given '0', whereas '1' was awarded when the exercise was performed correctly (Schoo et al., 2005a). Having some criteria for measuring exercise performance has the advantage of enhancing the consistency of measurement and producing a range of performance. However, the COEP scale is crude and the judgement was just a decision between correct and incorrect performance despite it had three judging criteria.

Therefore, exercise adherence is most commonly measured by using an exercise diary in terms of percentage of the recommended frequency. Other measurement methods have included an exercise diary in terms of time engaged in exercise, questionnaires, accelerometers and pedometers, and professional judgements. There are variations in exercise measurements between studies, as measurement methods of exercise adherence should reflect the objectives of the exercise intervention. To enhance the quality of measurement, self-report measures such as an exercise diary might supplement with objective or professionally judged measures in order to avoid outcome bias due to social desirability or recall errors (Jordan et al., 2010).

Exercise Effect and Adherence over Time

Regarding exercise effect and adherence change over time, a few studies reported the changes of exercise effect and adherence in people with KOA. A study on aerobic walking showed that both exercise effect and adherence declined after the intervention period (Kovar et al., 1992; Sullivan et al., 1998). Kovar et al. (1992) compared the effects of an eight-week aerobic walking regimen with usual care in a sample of 102 people with KOA. Ninety-two (90%) of the participants completed the study and demonstrated significant reduction of knee pain post-intervention (27%, $p = 0.003$). After one-year, 61% of the intervention group participants remained in the study (Sullivan et al., 1998). Without any intervention in between the period from post-intervention to one-year follow up assessment, the follow-up data showed that the post-intervention effect on pain reduction was not observed at one-year after intervention, and the self-report physical activity participation also declined for 41% across the follow-up period (Sullivan et al., 1998).

Another long-term study entitled Fitness and Arthritis in Seniors Trial (FAST) was an 18-month, multicenter, assessor-blinded 3-arm trial (Ettinger et al., 1997). FAST compared aerobic walking, resistance exercise, and health-education-control interventions in 439 older people with KOA, and the interventions were delivered at centres for 3 months followed by 15 months at home (Ettinger et al., 1997). The home-phase included a transition phase (4-6 month) and a maintenance phase (7-18 month). During the transition phase, participants were contacted biweekly by the exercise leader who made 4 home visits and 6 telephone calls to the participants. During the maintenance phase, the exercise leader contacted the participants by telephone calls every 3 weeks (6-9 month) and then monthly (10-18 month). In addition, the exercise leader would make extra home visits if a participant became ill or missed the exercise due to injury, illness, or other reasons. A total of 364 (84%) participants completed the 18-month study and the retention of participants was similar between the 3 groups. Exercise adherence on average over the 18-month period was 68% and 70% for the aerobic walking and resistance training groups respectively with no significant difference between the 2 groups. Decline of exercise adherence over the study period was noted from 85% at 3 months to 70% at 9 months, and finally 50% at 18 months. Ettinger et al. (1997) analyzed the relationships between exercise adherence and exercise effects by classifying the participants into high, medium, and low exercise adherence. The results revealed that there was a significant improvement in knee pain, self-reported physical disability, and 6-minutes walking distance with increasing exercise adherence in both exercise groups.

The results of these 2 studies supporting the effects of exercise interventions were associated with the degrees of exercise adherence. Although the amount of support provided to the participants for the exercise intervention in these 2 studies was different, decline of exercise adherence was observed in both studies over time.

The longest exercise intervention study was conducted by Pisters et al. (2010). These researchers followed up 200 people with hip and/or knee OA participating in exercise programmes for 5 years. Excluding attrition because of joint replacement surgery, the attrition rates for the follow-up at 3, 15, and 60 months were 4.0% (N = 8), 10.5% (N = 21), and 25.5% (N = 50) respectively. Exercise adherence at 3, 15, and 60 months of follow-up was 57.8%, 44.1%, and 30.1% respectively. In addition, Pisters et al. (2010) revealed that higher adherence to recommended exercise was significantly associated with improvements in pain and physical functioning, and this association was consistent over time (both within and after treatment period).

Therefore, the results of this study supported the observations of previous studies and extended the knowledge of exercise adherence to a longer period, showing that exercise adherence is further decreased over a longer period of time.

Factors Influencing Exercise Adherence

Poor exercise adherence is a compelling reason for the decline of exercise benefits over time in people with KOA. However, study into exploring the factors influencing exercise adherence in this client group is still limited (Marks & Allegrante, 2005; Roddy et al., 2005a). Until now, only six studies could be found in relation to this area; five of these studies are quantitative, and one is a qualitative study. In addition, one study on Korean women with osteoporosis or OA was found and included in this review of the literature.

Studies in People with KOA

Three quantitative studies (Damush, Perkins, Mikerky, Roberts, & O'Dea, 2005; Rejeski, Brawley, Ettinger, Morgan, Thompson, 1997; Seckin, Gunduz, Borman, & Akyuz, 2000) were conducted in older people with KOA. In a large exercise intervention study which compared the exercise effect between aerobic walking, resistance training and no exercise, Rejeski et al. (1997) applied the statistical techniques of regression modelling to identify the predictors of exercise adherence at the third, ninth, and sixteenth months in 439 older people with KOA. Potential predictors identified from the literature were entered into the regression model, including depression, social support, knee pain, perceived difficulties with activities of daily living, a global index of life satisfaction, prior exercise behaviour, time spent on exercising, and some demographic variables (i.e., age, race, gender, body mass index, and aerobic capacity). Rejeski et al. (1997) revealed that the strongest and most consistent predictor of exercise adherence for both the aerobic walking and resistance training exercise groups was exercise behaviour in the previous months of the trial. Otherwise, the other variables did not predict exercise adherence with any consistency across the various phases of the trial.

In addition, Damush et al. (2005) conducted a study on older adults and sought to understand motivational factors influencing older adults to join and maintain an exercise programme. They surveyed the motivational factors for community-dwelling older adults to join at the baseline of a strength training trial, and also examined the motivational factors to maintain at 12-months later. Completing the questionnaires were one hundred and ninety-one participants of whom 35.6% (N = 68) were older people with KOA at the baseline, and 125 participants of whom 28% (N = 35) were older people with KOA at 12-month follow-up. Damush et al. (2005) found that the diagnosis of KOA was positively related to the motivation to continue the exercise programme in association with an organized exercise opportunity ($p = 0.03$) and efficacy and outcome expectations ($p = 0.01$). In addition, knee pain was positively related to the motivation to continue the exercise programme in association with social support ($p = 0.0137$) and experience with the exercise task ($p = 0.005$). Although the sample size of participants with KOA was small in the study of Damush et al. (2005), the results contribute to provide some preliminary information about exercise adherence in older people with KOA.

Another study was carried out by Seckin et al. (2000) on people with KOA. A total of 120 people with KOA participated in this study, and the results found that exercise adherence was positively correlated ($p < 0.05$) with the duration of the disease ($r = 0.43$), pain scores ($r = 0.40$), difference of circumference of both knees ($r = 0.39$), and range of flexion degrees ($r = 0.41$). All of these significant correlations are clinical variables of the participants.

The only qualitative study was carried out by Campbell et al. in 2001. Campbell et al. (2001) explored the reasons for adherence and non-adherence with a home-based exercise treatment in people with KOA by nesting a post-intervention qualitative study in a RCT. Campbell et al. (2001) attempted to explore both post-intervention and longer term exercise adherence; 20 participants in the intervention arm were interviewed at three months after they completed the physiotherapy programme, and 8 of these participants were interviewed again one year later. The findings revealed that exercise attendance was high because of a sense of obligation and because of the relationship with the physiotherapist. In addition, exercise attendance was also related to the dislike of taking prescription drugs and a positive view of exercise. Exercise adherence was related to the participant's ability to accommodate the exercise into everyday life in relation to his/her living context. In addition, the participant's perception and experience of the exercise effect in treating the disease and ameliorating unpleasant symptoms were also important. Other factors influencing exercise adherence included perceived severity of knee symptoms and the existence of other comorbidities. Campbell et al. (2001) concluded that non-adherence was a reasoned response in relation to the clients' perceptions and experiences of exercise in relation to their values, beliefs, and living context. It is necessary to move away from viewing clients as either compliers or non-compliers and to include them as partners in the development of therapeutic exercise regimens.

Studies in People with Hip and/or Knee OA

Two quantitative studies were conducted on people with hip and/or knee OA (Schoo, Morris, & Bui, 2005b; Pisters et al., 2010) and subgroup analyses for the two types of OA were not performed. In the study of Pisters et al. (2010), researchers followed up a group of people with hip and/or knee OA for 60 months and found that exercise adherence was significantly associated with better treatment outcomes of pain ($p = 0.006$), self-reported physical function ($p = 0.025$), physical performance ($p = 0.002$), and self-perceived effect ($p = 0.026$). Hence, the experience of symptom improvement is an important factor influencing exercise adherence. With regard to the results of the study of Schoo et al. (2005b), exercise adherence (i.e., exercise at home during the intervention period) at the end of the 8-week exercise programme was significantly related to exercise adherence at the fourth week of the exercise programme (OR = 19.86; 95% CI = 4.84-81.56), concurrent physical activity (OR = 5.58; 95% CI = 1.15-27.05), and perception of not being physically active on enrolment into the exercise programme (OR = 0.07; 95% CI = 0.01-0.52). Hence, the clients' exercise adherence within the intervention period is likely consistent. In addition, their concurrent physical activity and awareness of inadequacy of physical activity are predictors of exercise adherence within the intervention period.

Studies in People with OA

In a Korean study, Shin, Hur, Pender, Jang, & Kim (2006) referred to the Health Promotion Model and explored the causal mechanism for committing to a plan of exercise by investigating explanations of exercise self-efficacy, exercise benefits and barriers in older women with osteoporosis (N = 64, 41.56%) or OA (N = 90, 58.44%). The results of this study revealed that exercise self-efficacy alone accounted for 53% of the variance in commitment to a plan of exercise in Korean women (age 40 years or above) with OA, and exercise barriers accounted for additional 4% of the variance; both regression models (exercise self-efficacy alone: $p < 0.0001$; exercise self-efficacy and exercise barriers: $p = 0.0076$) were significant in explaining commitment to a plan for exercise. The results demonstrated the importance of exercise self-efficacy in promoting exercise adherence of the clients.

Therefore, there are limited studies exploring the factors influencing exercise adherence in people with KOA. Most of these studies are quantitative studies that limit the exploration to the selected factors. The only qualitative study, in contrast, provides more information from the client's perspective. In summary, the results of the quantitative studies suggest that prior exercise behaviour, an organized exercise opportunity, social support, positive experience with the exercise's effect, self-awareness of inadequate physical activity, concurrent physical activity level, exercise self-efficacy and some clinical variables (i.e., duration of the disease, pain level, difference of circumference of both knees, and range of flexion degrees) were factors influencing exercise adherence among people with KOA. The qualitative findings of Campbell et al. (2001) indicate that exercise attendance is influenced by a sense of obligation, the relationship with the exercise instructor, the dislike of taking medicine and a positive view of exercise. Exercise adherence was more related to the clients' perceptions and experiences of exercise in relation to their values, beliefs, and living context. In addition, the clients' perceptions of the severity of KOA and the existence of comorbid conditions also affected their adherence to exercise. Some of these factors are difficult to change such as duration of the disease and comorbid conditions, but other factors may provide directions for developing strategies to promote exercise adherence for older people with KOA. Nevertheless, the lack of studies in understanding factors influencing exercise adherence in people with KOA indicates the early embryonic stage of this research area. More studies are needed in order to establish theoretical assumptions for guiding future studies. The next section of this chapter will review studies on interventions to improve exercise adherence of people with KOA.

Interventions that Promote Exercise Adherence

Developing strategies to promote exercise adherence for older people with KOA is needed in order to optimize the long-term effectiveness of exercise interventions. This section reviews the interventions that have been used to promote exercise adherence in people with KOA, and if available, discuss the effects of these interventions. In the following section, the interventions for promoting exercise adherence are discussed in three categories: (1) type of exercise, (2) delivery of exercise, and (3) self-management programme.

Type of Exercise

Type of exercise might not be an important factor in improving exercise adherence (Jordan et al., 2010). Only one previous study has compared different types of exercise interventions and provided information on exercise adherence in people with KOA (Ettinger et al., 1997). Ettinger et al. (1997) carried out a large-scale well-designed multi-centre 18 months study in the United States. It compared aerobic exercise and resistance exercise with health education control in 439 older people with KOA. The researchers reported that overall adherence to the exercise prescription was 68% for the aerobic exercise group and 70% for the resistance exercise group, and there was no statistically significant difference in exercise adherence between the two exercise groups ($t = 1.38$; $p = 0.17$) (Ettinger et al., 1997; Penninx et al., 2001).

Therefore, knowledge of exercise adherence in terms of types of exercise interventions has been very limited. However, with respect to the recommendations by the previous exercise intervention guidelines and professional organizations in osteoarthritis, a combination of various types of exercise including aerobic exercise, strengthening exercise and flexibility exercise should be recommended to people with KOA (ACR, 2008; AF, 2008; Misso et al., 2008; Roddy et al., 2005a; Zhang et al., 2008). Hence, the clinical relevance of comparing different types of exercise interventions for promoting exercise adherence in people with KOA should not be a priority.

Delivery of Exercise

Delivery of exercise intervention involves determining how to deliver the exercise intervention in order to enhance exercise adherence. It can be discussed in various terms such as supervised versus unsupervised, individual versus group, home-based versus centre-based, different supplementary materials and follow up interventions. Two studies have made direct comparisons of different delivery methods or combinations of methods in people with hip and/or knee OA or with chronic knee pain. A few studies used various follow-up interventions such as home visits and telephone calls to reinforce the exercise regimen (Baker et al., 2001; Ettinger et al., 1997; Shakoor et al., 2008; Tsang, 2003).

McCarthy et al. (2004) compared a home-based exercise intervention supplemented with an 8-week class-based programme, with the home-based exercise intervention alone in 214 older people with KOA. Both groups of participants were provided with education on exercise, and individual-tailored exercise teaching at the beginning of the study. The participants in the class-based supplemented group were also provided with supervision of the taught exercise in small-groups (maximum 12 participants) twice weekly for 45 minutes at a physiotherapy department. The results showed that participants from the class-based group demonstrated significantly greater improvement in all the outcome measures at post-treatment, 6- and 12-month follow-ups. However, according to the self-reported exercise adherence in a questionnaire of the participants, there was no evidence suggesting the time spent on exercising differed between the two groups. Therefore, it was suspected that the significant improvement in health outcomes in the class-based group might be related to correctness in carrying out the exercise movements instead of frequency or time in performing the exercise movements. Therefore, including a small-group supervised exercise programme in the delivery of exercise intervention may improve the exercise effects on the participants and will not lower the participants' exercise adherence.

In the study of Schoo et al. (2005a), supplementary exercise instruction materials were compared in 150 older people with hip and/or knee OA. Older people with hip and/or knee OA were provided with three 'in-clinic' sessions over an 8-week period. Sessions involved a face-to-face teaching exercise and clients were then given (1) a brochure, or (2) a brochure together with an audiotape, or (3) a brochure together with a videotape to take home for self-review of the exercise movements. The results showed that exercise adherence was good within the intervention period for all modes of supplementary exercise instruction materials with no significant difference between the 3 groups. Therefore, Schoo et al. (2005a) concluded that older people with hip and/or knee OA who received three sessions of face-to-face exercise instructions and a brochure on how to perform the exercise did not show additional benefits from other modes of supplementary exercise instruction. In addition, 79% of exercises were performed correctly in the group of receiving the brochure only.

A few studies used home visits and/or telephone calls to reinforce the exercise regimen (Baker et al., 2001; Ettinger et al., 1997; Shakoor et al., 2008), average exercise adherence for the short-term (not more than 16 weeks) ranged from 82.9% to 85%. However, in the study of Ettinger et al. (1997), decline of exercise adherence (i.e., 85% at 3 months, 70% at 9 months and 50% at 18 months) was observed despite that follow-up interventions were provided to the participants till 18 months after the exercise intervention. With regard to the study of Tsang (2003), follow-up interventions including two follow-up sessions at clinic to review and correct the exercise skills and home helpers' regular reinforcements for exercise were provided to the participants. The average exercise adherence rate was 52.59% and only 10.53% of the participants could perform all the exercise skills correctly at three months after the exercise intervention. Nevertheless, the average exercise adherence rate in this study should be read with cautious as 63.2% of the participants did not complete the exercise diary.

To conclude, exercise delivery methods with or without supervised exercise sessions make no difference concerning exercise adherence, but including a component of supervised exercise sessions may improve the exercise effect on the participants. In addition, supplementing an audiotape or videotape in conjunction with a brochure has showed no additional effect on exercise adherence. Lastly, follow-up interventions such as home visits and telephone calls may enhance short-term exercise adherence but may not be able to enhance long-term exercise adherence.

Self-management Programme

Self-management programmes, which borrow the concepts from the theory of self-efficacy (Marks, 2001) and in general focus on improving the client's perception of control of KOA and enabling them to apply more effective self-management methods in their daily living, are used to promote exercise adherence in people with KOA. There is a meta-analysis in this area (Devos-Combyet al., 2006) and two other studies that have not been included in this meta-analysis (Hughes et al., 2004; Yip et al., 2007a).

In the meta-analysis of Devos-Comby et al. (2006), 16 studies on exercise and self-management interventions in people with KOA were reviewed. The researchers commented that the design of intervention among these 16 studies was very heterogeneous. Some self-management interventions focused strictly on educational information about OA while others included more information such as values of exercise, techniques for pain management and/or coping (Devos-Comby et al., 2006). Devos-Comby et al.(2006) also concluded that there was a significant difference between self-management programme (mean effect size = 0.20; 95% CI = 0.08 – 0.33) and control groups only in psychological outcomes but not in physical outcomes (mean effect size = 0.09; 95% CI = -0.01 – 0.19). However, only 3 included studies reported exercise adherence rates (ranging from 48% to 81%); Devos-Comby et al. (2006) did not draw a conclusion on exercise adherence in self-management programmes.

The study of Hughes et al. (2004) was entitled Fit and Strong Intervention. In addition to exercise instruction, Hughes et al. (2004) provided a number of group problem-solving and discussion sessions which involved asking the participant's expectations of the exercise programme, providing systematic feedback on the participant's progress towards the achievement of their expectations, discussing with the participants values of the exercise, assisting the participants to solve problems encountered, and maintaining a record of the participant's performance to reinforce a sense of exercise efficacy. Therefore, over the 8-week exercise programme period, the participants also attended group problem-solving and discussion sessions (30 minutes each) three times per week for a total of 24 sessions. Hughes et al. (2004) reported that the participants in the exercise programme experienced statistically significant improvements in exercise efficacy ($p = 0.009$), 6-minutes distance walk ($p = 0.018$) and reductions in lower extremity pain ($p = 0.019$) and stiffness ($p = 0.028$). In addition, a 48.5% increase in exercise adherence ($p = 0.001$) was reported, although the improvement in efficacy to exercise adherence was borderline at 6 months ($p = 0.51$).

The study of Yip et al. (2007a) was conducted in Hong Kong in people aged 50 years or above with KOA, the exercise intervention comprised of stretching, walking and Tai Chi types of movement. Yip et al. (2007a) reported that significant improvements in the majority of outcome measures were noted at 16-week post-intervention in the experimental group but not in the control group, except for the improvement of muscle strength in hamstring and quadriceps muscles. Yip et al. (2007a) measured exercise adherence by asking the participants to recall and note the time engaged in leisure-light exercise (including stretching types of exercise, walking and Tai Chi movements) on a weekly basis. The results showed that there was a significant increase in the duration of light exercise practiced weekly from the baseline to 16 weeks after completion of the arthritis self-management programme in the intervention group (mean = 5.60 hours, SD = 4.48 at baseline; mean = 7.17 hours, SD = 5.18 at 16 weeks after completion of the programme; $p = 0.0001$) but not in the control group (mean = 5.07 hours, SD = 3.96 at baseline; mean = 5.14 hours, SD = 4.20 at 16 weeks after completion of the programme; $p = 0.95$).

Therefore, there are inconsistencies with regard to the effect of a self-management programme on physical health outcomes. According to the results in the studies of Hughes et al. (2004) and Yip et al. (2007), self-management programmes are effective in improving exercise adherence in people with KOA.

Summary of the Literature Review

In summary, KOA is a synovial joint disease that not only affects the articular cartilage, but also involves the entire joint. Clinical features form the basis of diagnosis and the criteria for classification of KOA have been proposed by the ACR (Altman, 1991). Classification of the severity of OA is less clear, and it is in general roughly classified by considering the severity of joint pain and the related physical disability.

A major problem regarding the excessive knee joint loading in KOA is related to lower limb muscle weakness, particularly the quadriceps muscles. Research evidence suggests that quadriceps muscles weakness in people with KOA is related to decreased muscle mass and muscle activation. These muscle problems are amenable to exercise interventions, especially muscle-strengthening exercises.

Knee pain and physical disability are the major symptoms of KOA. Knee pain in KOA is likely directly caused by damage in the bone and periarticular tissues of the knee joint, and indirectly due to quadriceps muscles weakness. Physical disability in KOA includes decreased knee ROM, reduced muscle strength and endurance, and various difficulties in activities of daily living.

A vicious cycle of knee pain, physical inactivity and disability is observed in people with KOA. As quadriceps weakness is an important factor promoting a downward spiral of this vicious cycle, exercise interventions especially quadriceps strengthening exercises are proposed to ameliorate the problem in muscle strength so as to break down this vicious cycle in KOA.

Exercise intervention is a general concept and can be described in terms of different types, frequency, duration, intensity, and delivery modes. It can be classified as aerobic, strengthening, and flexibility exercise, all of which are recommended for people with KOA. Some types of strengthening exercises in theory are more appropriate for people with KOA, such as isotonic exercise and closed kinetic chain exercise, because these exercise can better enhance their physical functioning. Exercise prescriptions are guided by two major principles: the principle of overload and the principle of specificity. Other considerations in exercise prescription include the plan for progression and prioritization between specific impairments and overall physical fitness.

Extensive studies have been carried out to test and summarize the effectiveness of exercise interventions in people with KOA. Exercise interventions for people with KOA are mainly low to moderate levels of exercise that have been considered safe and effective in reducing knee pain and physical disability. The effectiveness of exercise interventions in people with KOA is mainly evaluated by the measurements of knee pain and physical disability. For example, the WOMAC is a widely used self-report measurement tool for measuring the knee pain and physical function of people with KOA. In addition, the WOMAC as a whole is also a measurement of the disease-specific quality of life in people with KOA. Some of the studies also evaluate the effectiveness of exercise interventions in terms of generic quality of life; for example, the SF-12 and SF-36 are widely used instruments for this measurement in people with KOA. To supplement the self-report measurements, physical performance such as the timed-stand test is used in some studies to make objective measurement of physical functioning in the clients.

The effectiveness of exercise interventions in reducing knee pain and physical disability in people with KOA have been in general supported by the results of previous studies, and the effect sizes are small to moderate for both of these physical symptoms of KOA. The effectiveness on other health outcomes is inconclusive. Land-based exercise, muscle-strengthening exercise, and aerobic exercise are the exercise types with more substantial and consistent research evidence supporting their effectiveness in reducing knee pain and physical disability in people with KOA. In addition, previous studies showed that a combination of muscle-strengthening exercise and flexibility exercise had better effects than muscle-strengthening exercise alone in terms of reducing knee pain and physical disability, and improving muscle strength in people with KOA. Research evidence on types of exercises is abundant in evaluating the effect of exercise interventions in people with KOA. However, the studies regarding the dosage and delivery of exercise interventions are inconclusive due to the considerable heterogeneity in these areas between the previous studies.

The exercise intervention studies in people with KOA in Hong Kong are limited to four studies. These four studies have different focuses but share two common characteristics: all are quantitative studies and the exercise interventions are developed by the healthcare professionals. Three out of these four studies are short-term studies with small sample size. The latest study has followed the clients up to one-year, but suffers from high attrition rates. The generalizabilities of these studies are limited by some methodological flaws. With regard to running the exercise interventions, the two studies with the intervention carried out by nurses have demonstrated the expanded roles of nurses in the community setting.

Exercise adherence has been identified as an important issue to be addressed for the long-term beneficial effects of exercise in people with KOA. However, there are few studies in this area. The measurement of exercise adherence is mainly in terms of percentage of the recommended frequency of exercises in the exercise intervention. An exercise diary is commonly used for collecting data on exercise adherence and it may be better than other methods such as questionnaires in terms of less recall and misjudging bias of the participant. However, exercise performance can influence the ultimate exercise effect on the participant. Objective measurement of exercise performance can supplement the results of exercise adherence, and is therefore suggested.

A direct relationship between exercise effect and exercise adherence has been demonstrated in three previous studies in people with KOA. Decline of exercise adherence together with the corresponding exercise effect are also observed in these three studies. The average percentage of exercise adherence reported in previous studies ranged from 30.1% to 86% and the duration of measurement ranged from 6 weeks to 5 years.

With regard to the factors influencing exercise adherence in people with KOA, only a few studies have been found. The majority of these studies are quantitative in nature and five quantitative studies have suggested some predictors of exercise adherence. However, the results of these quantitative studies are limited to the selected factors of the studies and half of these studies are secondary data analyses. Some of these factors such as duration of the disease and prior exercise behaviour are difficult to intervene and some other factors such as positive experience with the exercise effect and pain level are results of the exercise intervention. Thus these quantitative studies have provided only limited insights for developing strategies to enhance exercise adherence in people with KOA. In contrast, the only qualitative study that interviewed the participants at 3-months and one-year after the exercise intervention has offered fruitful insights about promoting exercise adherence in people with KOA. The findings of this qualitative study highlight the importance of considering the clients' perceptions and experiences of exercise in relation to their values, beliefs, and living context in the development of exercise interventions in order to promote exercise adherence. Therefore, there are limited studies in the area of exercise adherence in older people with KOA and inadequate well-established theoretical assumptions for guiding development of exercise programmes.

A small number of studies related to interventions that promote exercise adherence in people with KOA were also found. One study compared aerobic exercise to resistance exercise and could not find a statistically significant difference in exercise adherence between the two exercise groups. With regard to delivery of exercise, supplementing home exercise by supervised exercise sessions and providing a brochure might enhance exercise adherence in people with KOA. In addition, providing follow up interventions might enhance the short-term exercise adherence but the long-term effect has not yet been evidenced. Self-management programmes have been examined in some of the previous studies in people with KOA. Such programmes borrow the concepts from the theory of self-efficacy may be effective in promoting exercise adherence among the clients, but their effects on physical health outcomes are inconsistent in previous findings.

Conclusion

Despite abundant empirical evidence that supports the values and effectiveness of various exercise interventions in reducing the major symptoms of

KOA in people with KOA, research studies into understanding and promoting exercise adherence have been limited. In addition, the research implication for promoting exercise adherence by taking the client's perspective in the design of exercise programme in this client group have so far been neglected. The importance of promoting exercise adherence in people with KOA is justified as it affects the long-term benefits of exercise for the clients. There is a lack of well-established theoretical assumptions in the research area of promoting exercise adherence in people with KOA, except that some studies have borrowed the concepts from the theory of self-efficacy to develop self-management programmes. To expand the knowledge base of this research area, a logical approach to promote exercise adherence is to have a better understanding of the factors influencing exercise adherence and use the information in development of the exercise intervention. However, this approach of developing exercise intervention is not evidenced in previous studies in people with KOA. The literature has suggested that clients' perceptions and experiences of exercise in relation to their values, beliefs and living context should be considered in the development of exercise programmes in order to enhance exercise adherence. However, the exercise interventions in previous exercise intervention studies in people with KOA in Hong Kong have all been developed solely by healthcare professionals. This review of the literature therefore identifies a research gap related to exploring the role of clients' perceptions and experiences of exercise in developing exercise interventions for those with KOA in Hong Kong. An exploration of perceptions and experiences of exercise among older Chinese people with KOA in Hong Kong, therefore, is an important initial step. The information thus obtained from the client's perspective could be used to revisit the existing exercise programme in the literature and re-establish a tailor-made exercise programme for the clients. Then a pilot study of the tailor-made exercise programme could be carried out in order to preliminary evaluate its acceptability on promoting exercise adherence in older Chinese people with KOA. To conclude, developing and piloting a tailor-made exercise programme would bring the exercise management of KOA forward in enhancing exercise adherence and long-term beneficial effects of exercise in older Chinese people with KOA in Hong Kong. Therefore, the aim of this study is to develop an exercise programme and pilot its acceptability to promote continual practice of therapeutic exercise among older Chinese people with KOA in Hong Kong. The next chapter will provide an overview of the study method.

CHAPTER THREE

AN OVERVIEW OF THE STUDY METHOD

The overall aim of the present study is to develop an exercise programme and pilot its acceptability to promote continual practice of therapeutic exercises among older Chinese people with knee osteoarthritis (KOA) in Hong Kong. In the light of the literature, the clients' perceptions and experiences of exercise are important information for understanding the factors that influence their exercise adherence. It has been argued that exercise adherence is very important for the long-term benefits of therapeutic exercise. To enhance exercise adherence, the clients' perceptions and experiences of exercise should be addressed in the development of an exercise programme. This chapter presents an overview of the methods used in this study for the development and pilot testing of an exercise programme aimed at promoting exercise adherence in older Chinese people with KOA in Hong Kong.

With regard to the overall aim of this study, three main objectives were developed to guide the study:

1. To explore perceptions and experiences of exercise with a group of older Chinese people with KOA in Hong Kong.

2. To develop an exercise programme which aims at promoting continual practice of therapeutic exercises among older Chinese people with KOA in Hong Kong.

3. To pilot the acceptability of the exercise programme and preliminary assess its effect on KOA in a group of older Chinese people with KOA in Hong Kong.

A mixed-methods research approach was employed according to the objectives and nature of inquiry. The study consisted of two phases: Phase I and Phase II.

Phase I was an exploratory qualitative study using individual semi-structured interviews for data collection. The Phase I study enabled the researcher to explore factors influencing exercise adherence in older Chinese people with KOA in Hong Kong. Perceptions and experiences of exercise were explored in a group of older Chinese people with KOA in Hong Kong. Data collected from the Phase I study were analysed and used to inform the development of an exercise programme for this client group.

To develop an exercise programme for older Chinese people with KOA in Hong Kong, the implications for the development of an exercise programme from the findings of the Phase I study were used to revisit the literature on exercise interventions in older people with KOA. A draft exercise programme thus was produced and validated by an expert panel. In addition, the exercise movements of the exercise programme were piloted with two older Chinese people with KOA in Hong Kong.

The exercise programme was a delivery of exercise skills and the related knowledge to the older Chinese people with KOA in Hong Kong at a community centre using a group teaching approach. Seven exercise movements were taught in the exercise programme and these exercise movements were prescribed in the light of the findings of the Phase I study and targeted to match the client's exercise ability, preferences, and daily routine. The design of the exercise programme was also tailored with respect to the findings of the Phase I study in order to promote exercise adherence in older Chinese people with KOA in Hong Kong.

Phase II was a pilot study for evaluating the acceptability of the exercise programme. The Phase II study adopted a mixed-methods study design that consisted of quantitative and qualitative components. The quantitative data were used to evaluate the acceptability of the exercise programme in terms of the participants' satisfaction with the exercise programme, their adherence to the recommended frequency of practising the exercise movements, and their mastering of the exercise movements. In addition, changes in the participants' health outcomes were preliminary assessed to identify the possible therapeutic effects of the exercise regimen. The qualitative component was the collection of data on the participants' perceptions and experiences of participating in the exercise programme. The qualitative findings were used to supplement the quantitative results in understanding the acceptability of the exercise programme.

The next two chapters will detail the Phase I and Phase II studies.

CHAPTER FOUR

THE PHASE I STUDY: DEVELOPING THE EXERCISE PROGRAMME

METHODS (PHASE I STUDY)

Introduction

As mentioned in Chapters 2 and 3, it is important to consider the clients' perceptions and experiences of exercise when developing an exercise programme for older Chinese people with knee osteoarthritis (KOA) in Hong Kong. The aim of the Phase I study was to explore perceptions and experiences of exercise with a group of older Chinese people with KOA in Hong Kong. The findings would be used to develop a therapeutic exercise programme. This section presents detailed information about the methods used to achieve the aim of the Phase I study, including a description of the research design, sampling issues, sample size planning, the sampling process, data collection methods and procedures, ethical considerations, and data management and analysis. In addition, a pilot study with the interview guide is reported. In the last section, issues of the trustworthiness of the Phase I study data are discussed.

Aim of the Study

The aim of the Phase I study was to explore perceptions and experiences of exercise with a group of older Chinese people with KOA in Hong Kong. The clients' perceptions and experiences of exercise are likely to influence their exercise behaviour and commitment to continual practise of exercise (Campbell et al., 2001).

As little was known about the factors influencing continual practice of therapeutic exercise in older Chinese people with KOA in Hong Kong, an exploration of perceptions and experiences of exercise from the clients' perspective would provide important local information for the development of an exercise programme and promotion of continual practice of the recommended exercise in this group of clients.

Study Design

An exploratory qualitative study design was adopted in the Phase I study. An exploratory qualitative study design is descriptive in nature without having particular disciplinary or methodological roots (Polit & Beck, 2004). This type of study design is based on the general premises of naturalistic inquiry and uses content analysis to comprehensively summarise the study topic (Polit & Beck, 2004). The use of an exploratory qualitative study design was appropriate because there was scant knowledge about perceptions and experiences of exercise from the perspective of older Chinese people with KOA in Hong Kong (Morse & Field, 1995). Perceptions and experiences in this regard are emerging, so they could best be explored using a qualitative approach (Polit & Beck, 2004). The Phase I study focused on a direct exploration of information relevant to developing exercise interventions from the clients' perspective; a general exploratory qualitative approach would be adequate for achieving the aim of the study (Morse & Field, 1995; Polit & Beck, 2004).

Sample

Principles of Sampling

According to Morse and Field (1995), the main principles for guiding qualitative sampling are appropriateness and adequacy. Appropriateness refers to the selection of people who can best inform the research phenomenon. Adequacy refers to the recruitment of informants who can provide a full and rich description of the research phenomenon. These principles were used to guide the sampling of this Phase I study.

Sampling of Settings

The sampling of settings was the first step in achieving the principle of appropriateness (Morse & Field, 1995). Settings which promoted accessibility to representative informants were identified and approached. Two types of setting were appropriate in this study for the recruitment of informants. They were the home-help service centres provided by non-government organizations for older people, and the government-subsidized orthopaedic specialist outpatient clinics. These settings were the venues most accessible to the representative informants because, in Hong Kong, the majority of older people with KOA reside in the community. These older people with KOA regularly require medical attention at specialist clinics due to the chronic symptoms of the disease. They also require home-help services due to the disability caused by the disease, which may affect their ability to carry out some necessary domestic activities. In addition, the chronic nature of the disease is likely to create a financial burden on older people with KOA, who are often retirees without income but with regular spending on medical or social services. Therefore, the majority of potential informants would be likely to use government-subsidized services such as those from non-government organizations and government-subsidized clinics to minimize the regular expenses due to KOA.

Home-help service centres of a non-government organization and an orthopaedic specialist outpatient clinic under the administration of the Hong Kong

Hospital Authority were the settings utilized in this study. Five home-help service centres were selected, which covered five living districts of Hong Kong Island, Kowloon, and the New Territories in Hong Kong. Each of the home-help service centres served a few hundred older people with various home-help needs. The orthopaedic specialist outpatient clinic was within a regional acute care hospital providing services to approximately 850 clients with KOA mainly from three residential districts in the New Territories in Hong Kong. In general, the clients were regularly followed up at the clinic every four to six months.

Sampling of Informants

Purposive sampling is considered to be the most appropriate sampling method for achieving appropriateness and adequacy in qualitative studies (Patton, 2002; Polit & Beck, 2004). It was employed in this study for the recruitment of informants and achieved by identifying people who could best inform the research phenomenon. Among people who fulfilled the recruitment criteria, a maximum variation sampling strategy was used to select informants with a wide variation of perceptions and experiences of exercise (Polit & Beck, 2004). Informants with diverse socio-demographic backgrounds were considered in the sampling process.

The inclusion criteria of the sample included individuals: (1) aged 60 years or above, (2) diagnosed with KOA by a medical officer, (3) living at home, and (4) able to communicate verbally using Cantonese. The exclusion criteria of the sample included individuals: (1) who were chair or bed bound, (2) who had undergone knee surgery, (3) with a terminal illness, and (4) known to have a psychiatric illness.

Sample Size

The sample size in qualitative studies is determined by the study approach and data collection method (Morse & Field, 1995). For example, if one is doing a phenomenological study and interviewing each informant several times, one can obtain a huge amount of data from each informant, so the sample size can be small. Semi-structured interviews are likely to generate relatively shallow data, so only a small volume of data will be obtained from each interview (Morse, 2000). According to Morse (2000), at least 30 informants would be required for the Phase I study because this study was going to use semi-structured interviews to collect data and each informant would be interviewed only once. Therefore, this study aimed to recruit a minimum of 30 informants to ensure a reasonable exploration of the study topic.

Sampling Process

The sampling process describes the procedures for recruiting the informants of this study. Regarding the non-government organization setting, the head of the home-help service teams for older people was firstly contacted and given an explanation of the purpose of the study and the sample recruitment criteria. With the permission and assistance of the head of the home-help service teams, older people of the home-help service who fulfilled the sample recruitment criteria were listed by name, sex, and age. Supervisors of each of the district centres were also contacted for more information about the potential informants, such as living arrangements, mobility, and whether or not they had KOA. Potential informants with a range of socio-demographic backgrounds were then selected by the researcher. These potential informants were firstly informed by the centre workers about the invitation to be interviewed for the study. Only those potential informants who agreed to be interviewed were approached by the researcher.

Regarding the recruitment of informants from the orthopaedic specialist outpatient clinic, the department head was contacted and given an explanation of the purpose of the study and the sample recruitment criteria. With the permission of the department head, a registered nurse working in that department was assigned to assist with the sampling process. The researcher contacted the registered nurse and explained the details of the sample recruitment criteria before arranging for her assistance with the recruitment process. As the researcher was not permitted to screen for potential informants in the clinic, the registered nurse played a key role in screening for clients who met the inclusion criteria of the study in the clinic. Among the clients who attended for follow-up appointments at the clinic, the registered nurse approached those who met the sample recruitment criteria of the study. Only those clients who agreed to participate in the study were referred by the registered nurse to the researcher.

Data Collection

Semi-structured Interview

A semi-structured interview is a guided interview which is used when the skeleton of the interview topic is known but the answers cannot be anticipated (Morse & Field, 1995). As major exploratory areas of the Phase I study were guided by the need to develop an exercise programme which could promote continual practice of therapeutic exercise for KOA, semi-structured interviews were appropriate and therefore employed for data collection. The use of semi-structured interviews using broad open-ended questions and prompts ensures that a specific set of topics is covered in the interview (Gillham, 2000; Pilot & Beck, 2004). On the other hand, it allows the interviewees the necessary freedom of expression and also elaboration on what is relevant to them (Gillham, 2000; Pilot & Beck, 2004). Therefore, the use of semi-structured interviews allows the researcher to obtain the necessary information while the informant has the freedom to respond and illustrate concepts. Semi-structured interviews are useful for exploring difficult issues or those which cannot be directly observed, such as feelings and thoughts (Patton, 2002). They allow the researcher to enter into the clients' perspective (Patton, 2002), which is assumed to be important in the development of an exercise programme for them. Interviewing the informants individually further promotes the freedom and time for responses. Therefore, individual semi-structured interviews were used for data collection in the Phase I study.

Interview Guide

A semi-structured interview guide (Appendix 4.1) was developed based on previous literature about factors influencing exercise adherence in older people with KOA (Campbell et al., 2001; Damush et al., 2005; Marks & Allegrante, 2005; Minor & Brown, 1993; Pisters et al., 2010; Rejeski et al., 1997; Schoo et al., 2005b). The interview questions were prepared strategically by exploring the informant's living context broadly and then focusing on the informant's perceptions and experiences of exercise (Morse & Field, 1995). A few broad open-ended questions were designed to guide the informant to engage in expressing thoughts and experiences in different areas of the interview topic (Morse & Field, 1995). With the aim of ensuring that the entire area was adequately explored, prompts were developed for each question (Gillham, 2000; Morse & Field, 1995). The use of an interview guide with a list of questions and prompts also enabled the researcher to cover important topics in every interview (Gillham, 2000; Patton, 2002). The face validity of the interview guide for this study was attained by inviting three researchers who had rich qualitative study experience to comment and give suggestions, and to approve the final version of the interview guide. Areas of focus in the interview guide for soliciting factors which might affect exercise adherence included the typical living pattern, management methods of KOA, definition of and views on exercise, practical experience of exercise, and preferences in learning exercise.

Socio-demographic and Clinical Data Sheet

A socio-demographic and clinical data sheet (Appendix 4.2) was developed for obtaining contextual information about the informants, which facilitated the comprehension and accurate interpretation of the interview data. Information regarding age, sex, education, marital status, type of residence, living arrangements, employment status, social assistance, religion and its practice, medical history of the disease, and the presence of other chronic diseases was assessed.

Pilot Study

The purpose of the pilot study in the Phase I Study was to test the practicability of the interview guide and also the interviewing skills of the researcher prior to the data collection of the main study. Two informants were recruited from one of the home-help service centres for interviews in the pilot study. With regard to the interview process, the interview guide was found suitable and adequate as a guide for exploring the clients' perceptions and experiences of exercise. In view of this, it was not necessary to modify the interview guide for the main study.

Data Collection Procedures

The researcher contacted all the referred potential informants by telephone to introduce herself and to explain to potential informants the purpose of the study, their involvement, and their rights. With the verbal consent of the informants, the researcher made appointments to meet them at their homes. The interviews were carried out in the late morning or late afternoon, which were day-time breaks for the informants. This allowed the interview to be carried out in a relaxed atmosphere with minimal interruptions. During the home interview, the researcher introduced herself and deliberately began the interview with some informal social conversation. The researcher then repeated the explanation of the purpose of the study, the informant's involvement in the study, the purpose of the interview, the need for audio-recording of the interview, the storage and usage of the interview data, and the informant's rights to refuse to answer any question or to withdraw from the study. The informant was given an information sheet about the study which also contained the researcher's contact information. Written informed consent was obtained from the informant before data collection. All of the interviews were conducted by the researcher and audio-recorded. The duration of the main interview process ranged from 35 to 75 minutes.

Ethical Considerations

Ethical approval for the Phase I study was initially obtained from the Survey and Behavioural Research Ethics Committee in The Faculty of Medicine of The Chinese University of Hong Kong (Appendix 4.3). Approval for conducting the study was then obtained from each of the institutions concerned. All of the informants participated in the study on a voluntary basis. They were given a detailed explanation of the purpose of the study, their involvement in the study, issues concerning confidentiality and anonymity, and the right to withdraw from the study at any time. Information sheet (Appendices 4.4 and 4.5) containing information about the study and also the name, title, and telephone number of the researcher was given to the informant. Written consent (Appendices 4.4 and 4.5) was obtained from each of the informants before data collection. Privacy was enhanced by interviewing the informant at home with the interview time being chosen by the informant. All the data were kept confidential and put in a safe place where only the researcher could have access to them. The data will be retained for 10 years and then destroyed. All the data were used solely for the purpose of the study.

Data Analysis

Content analysis was employed to analyse the interview data. Content analysis is a process of text reduction in which segments of the interview transcription are reviewed within the context of the entire interview with the aim of identifying core consistencies, meanings, and significance from the interview data (Morse & Field, 1995; Patton, 2002). Although there are variations in the technique of conducting content analysis, core steps include managing data, reviewing and coding data, developing categories, and interpreting the findings (Gillham, 2000; Morse & Field, 1995; Polit & Beck, 2004). Each of these data analysis steps is reported in the following section.

Managing Data

The audio-recorded interviews were transcribed verbatim into Cantonese early in the study, while the researcher was still collecting data. Cues including pauses, changes in tone, and particular emotions or events during the interviews were noted by words in brackets, inserted immediately after the corresponding script. The interview data were organised into a table format. The table for organising the transcription consisted of four columns: the first column was the code of the informant according to the interview number; the second column was the question or response number using 'I' to indicate interviewer and 'P' to indicate participant; the third column was the transcription, with each question or response arranged in a separate row corresponding to the question or response number; and the fourth column was for coding. Please refer to Appendix 4.6 for a sample of the transcriptions. The duration of the interview was recorded at the end of the transcription. Each piece of the transcription was checked and rechecked against the audio records several times on separate dates by the researcher to ensure their accuracy.

The socio-demographic and clinical data sheet was attached to the corresponding transcription. A hard copy of the data, together with the audio interview records, was kept in a safe place.

Reviewing and Coding Data

Data reviewing and initial coding were started early, when data collection was still ongoing. The researcher listened to the audio-recorded interview within one or two days following completion of each interview, in order to become familiar with the interview data and identify new prompts for subsequent interviews. This ongoing review of data also assisted the researcher to reflect on her own interviewing skills. Patton (2002) claims that such overlapping of data collection and analysis is useful for improving data quality. All the transcriptions were reviewed several times until the researcher was immersed in the interview data. The researcher's immersion in the data facilitated her comprehension of the meanings and concepts contained within the data (Morse & Field, 1995).

Latent content analysis was used for the coding process in this Phase I study. Sentences or paragraphs were reviewed within the context of the entire interview to identify and code the major thrust or intent of the segments of transcription that were descriptions related to continual practice of therapeutic exercise for KOA. The initial coding was carried out by reviewing the data segment by segment and some line by line. Initial descriptive labels were developed and written in the last column of the transcriptions. The researcher attempted to use the informant's words or phrases in the initial descriptive labels thus the researcher's biases were limited in this process of developing initial codes (Morse & Field, 1995). The initial codes were reviewed in light of the flow of communication throughout the interview to ensure that significant meanings within different segments of transcription were accurately reflected. After the process of initial coding, initial codes were reviewed and compared between the transcriptions and then the initial codes were re-coded if segments of transcription with similar meanings were coded by different descriptive labels.

Developing Categories

Based on the findings from the reviewing and coding process described above, a list of major categories was developed and described with reference to the emerging themes from the codes, and the categories were made as broad as possible. This was guided by the 'rule of parsimony', aiming at in-depth data analysis and interpretation (Morse & Field, 1995). For example, data with codes related to 'when to exercise', 'what the exercise was', 'where to do the exercise', 'how to do the exercise', and 'reasons for persistence with the exercise' were converging to the theme of 'the practice of exercise' thus they were sorted to the same category. Therefore, the interview data were sorted into the broad categories and the sorting process was carried out on computer using the copy-and-paste function in Microsoft Word.

The broad categories and the data within them were then checked and rechecked for internal homogeneity and external heterogeneity. Internal homogeneity and external heterogeneity are two major criteria for constructing categories (Patton, 2002). Internal homogeneity refers to the coherence of the data within a category and external heterogeneity refers to the clear distinction between categories. In addition, the set of categories was also checked for completeness to ensure that the interview data were reasonably included in the categories. Data within each major category were then reviewed again to identify sub-categories. For instance, 'exercise habit' and 'continuation of exercise' were sub-categorized according to their different dimensions under 'the practice of exercise' category.

Further checking of objectivity in the development of categories was carried out by inviting an independent researcher who was experienced in conducting qualitative data analysis to read two randomly selected transcriptions and develop categories independently. The categories were then compared and the different findings were discussed. More than 80% agreement was found between the categories developed by the study researcher and the invited researcher.

Interpreting the Findings

Both within-case and cross-case analyses were carried out. Within-case analysis involved the identification of the relationships between categories and sub-categories from individual cases (Patton, 2002). For example, the development of exercise habit was related to the reasons for continuation or discontinuation of exercise. Cross-case analyses were carried out by using tabulations to uncover similarities and differences in the interview data across cases (Patton, 2002). Special attention was paid to negative cases, where they existed, to clarify the completeness of the explanation of the related phenomenon (Morse & Field, 1995). For instance, most of the informants reported one or more positive experiences for continuation of exercise and this was a pattern similar across cases. However, there were a few individual cases who reported negative experiences from doing exercise thus discontinued the exercise. These negative cases supplemented information to the positive cases and enhanced a more complete explanation of the reasons for continual practice of exercise among this group of informants. Therefore, the researcher sought explanations for the analysed findings and described the study phenomenon based on the facts obtained from the interview data. As a result, perceptions and experiences of exercise among the informants were explored and insights were obtained for developing an exercise programme for older Chinese people with KOA in Hong Kong.

Issues of Trustworthiness

It is important to ensure trustworthiness of the study data so that the study findings can reflect the truth of the phenomenon under study. According to Lincoln and Guba (1985), there are four criteria for establishing the trustworthiness of qualitative data. The four criteria are credibility, dependability, confirmability, and transferability of the data. Credibility is a primary criterion and considered as an overriding goal of qualitative research (Lincoln & Guba, 1985). It refers to establishing confidence in the truth of the data and their accurate interpretations. Dependability refers to ensuring consistency of the data across similar participants in a similar context. Confirmability refers to confirming the neutrality of the researcher so that the data are determined by the informants and their immediate context in the inquiry. Transferability refers to achieving a reasonable extent to which the data are applicable in other contexts or with other participants. These criteria actually go beyond evaluation of the data alone, but also assess research design, sampling, and the conclusions drawn from the data analysis (Polit & Beck, 2004). The importance of these criteria was acknowledged and measures corresponding to these criteria were deliberately incorporated into the method of the Phase I study.

Credibility

The study was qualitatively designed using individual semi-structured interviews for data collection. This study design enabled the researcher to obtain first-hand accounts of perceptions and experiences of exercise from the informants. Using individual semi-structured interviews for data collection enhanced the breadth and depth of exploration of the issue as the informants could freely express their thoughts and feelings (Gillham, 2000; Polit & Beck, 2004). There is no pre-imposed idea when using semi-structured interviews. In addition, the informants did not use paper and pencil, and their provision of data was not restricted by educational level.

Therefore, the study design promoted a true and broad exploration of the study topic and thus enhanced the credibility of the study.

Purposive sampling of informants in this study further enhanced the credibility of the data, as the diversity of backgrounds of representative informants ensured that authentic and rich information regarding the study phenomenon could be obtained (Morse & Field, 1995). In addition, the minimum sample size of 30 in this study ensured an adequate description of the study phenomenon (Morse, 2000).

In data collection, the semi-structured interview guide used in this study was based on information from the literature, and its face validity was supported by three other researchers who were academic staff with rich experience in qualitative study and the development of interview guides. The interview guide was also piloted to ensure its practicability for the collection of relevant data.

During the data collection process, the researcher contacted the informant by phone before the home interview. She also started the interview with some informal social conversation and re-introduced both herself and the study. These actions helped to establish a trusting relationship with the informant and a relaxed atmosphere so that the informants were more comfortable about expressing themselves during the interview; this enhanced the credibility of the interview data (Lipson, 1991). In addition, the researcher arranged the interview during the informant's free time so that the informant was not occupied by other matters or in a hurry during the interview. This arrangement further enhanced the credibility of the interview data.

In a qualitative study, the interviewer is the research instrument. The credibility of the interview data depends largely on the interviewing skills of the interviewer (Gillham, 2000; Morse & Field, 1995; Patton, 2002). The researcher therefore prepared for the interviews by reading the literature on interviewing skills, practising the skills on colleagues, and piloting the interview prior to the main study even though she had had some interview experience.

The researcher was punctual, maintained a professional appearance, and brought her University identity card to help create a trusting relationship with the informants, as informants make judgements about the external characteristics of the interviewer (Lipson, 1991). In addition, the researcher interviewed the informants in Cantonese, which is the mother tongue of both the researcher and the informants; therefore, there was no language barrier to communication. Moreover, the researcher's background of being Chinese and a resident in Hong Kong facilitated her communication with the informants. A friendly approach was used to establish rapport and engage the informant in a relaxed atmosphere which encouraged free expression. She listened sincerely and attentively, conveying the message that she was focused on the informant throughout the interview (Lipson, 1991).

The researcher remained calm during each interview in order to manage an effective control of the interview. She also made herself ready to adapt to the different interview environments and be flexible to the informant's response to the interview questions. For example, the sequence of the interview questions was adjusted as appropriate to match variations in the logical flow of the interview. She also listened actively so that she was able to use probes or prompts appropriately during the interview in order to explore the necessary information adequately. In addition, she maintained a high awareness of self-expression in both verbal and non-verbal behaviour. For example, she used open- and closed-ended questions in a sensible way but avoided double questions or leading questions. She also used verbal and non-verbal encouragers such as head-nodding and uttering 'hm-hm' to encourage the informants in telling their stories and expressing their views, but avoided impatient or disapproving responses (Lipson, 1991). By means of these effective interpersonal and interviewing skills, a substantial account of the informants' perceptions and experiences of exercise could be obtained from the interviews.

In the process of data analysis, vigilance in data management is important in securing the true data (Brink, 1991). All the interviews were audio-recorded to ensure completeness of the interview data. All the audio-recorded interviews were transcribed verbatim with cues and events being noted in the transcripts for data analysis. This facilitated a credible data analysis because using transcriptions for data analysis facilitated the researcher in reviewing the data deeply and comprehensively (Gillham, 2000). In addition, each piece of transcription was checked several times to ensure accuracy. These checking procedures ensured a true record of the interview data and avoided omission or distortion of data, thus enhancing data credibility (Gillham, 2000).

Regarding the reviewing and coding of data, the process was carried out by using the first language (Cantonese) of both the informants and the interviewer, which enhanced the accuracy of the data interpretation in this study (Twinn, 1997). The immersion of the researcher into the interview data through repeated listening and reviewing of the data further enhanced the credibility of data interpretation (Patton, 2002). The use of the informant's words or phrases as much as possible for initial coding limited the researcher's biases (Morse & Field, 1995).

The 'rule of parsimony' was used to guide the development of categories. The categories were also checked and rechecked for internal homogeneity and external heterogeneity. Therefore, problems threatening the credibility of data interpretation, such as fragmented interpretation of the data, incorrect interpretation of the data, ambiguous categories, or incomplete analysis of the data, were avoided (Morse & Field, 1995; Patton, 2002). In addition, the researcher was alert to negative cases and this also enhanced the credibility of data interpretation (Morse & Field, 1995). Furthermore, the emerging categories and subcategories were translated into English for reporting; to ensure the translation equivalence, an independent researcher, who was proficient in both Cantonese and English, was invited to comment on the translations.

Dependability

An interview guide was used in the study so that major areas being covered in the interviews were consistent across informants; this enhanced the dependability of the data. All the interviews of this Phase I study were carried out by the same researcher and this avoided inconsistencies in data collection by different researchers due to variations in interview styles or skills; this further enhanced the dependability of this study (Polit & Beck, 2004). In addition, the same researcher carried out all the data analysis and this could enhance the dependability of data interpretation in the study. Moreover, the dependability of data interpretation was enhanced by having another researcher experienced in qualitative data analysis develop categories from two randomly selected transcriptions independently and by setting a level of 80% agreement for accepting the categories.

Confirmability

The researcher constantly monitored her own influence on each interview in order to maintain neutrality to the interview data (Polit & Beck, 2004). She also constantly reflected on her personal biases, motivations, interests, or perspectives that might affect the confirmability of the data during the study process (Lincoln & Guba, 1985). In the process of data analysis, tabulation methods were employed to improve the objectivity of the categories (Morse & Field, 1995; Patton, 2002).

However, member-checking which is to return the categories to informants for verification of interpretation was considered but was not adopted in this study. According to Pilot & Beck (2004), the procedures of member-checking do not constitute proof that the findings and interpretations are credible because many informants might be too polite to disagree with the researcher's interpretation. In addition, Morse & Field (1995) has argued that the findings from qualitative data analysis have involved the researcher's effort of integrating data from multiple informants in the study thus checking such an integrated product with any one of the informants in the study is invalid.

Transferability

Sampling of settings was carried out in the sampling process to enhance transferability of the study data. Sampling informants from two settings and different living districts broadened the representativeness of the sample and minimized the threat to transferability due to limitations arising from geographical differences. To facilitate evaluation and transferring of the findings and conclusions to similar situations by other researchers, the setting, sampling, data collection method and procedures, and data analysis were clearly described for this study (Pilot & Beck, 2004).

Summary of the Methods

In summary, the aim of the Phase I study was to explore the perceptions and experiences of exercise with a group of older Chinese people with KOA in Hong Kong. The Phase I study employed an exploratory qualitative study design. The sample of the study was obtained by purposive sampling at the settings of five home-help service centres and one orthopaedic specialist clinic in Hong Kong. Data collection was carried out by individual semi-structured interviews with the informants in their homes with the assistance of an interview guide. A pilot study was conducted to test the practicability of the interview guide. Content analysis was adopted in this Phase I study for data analysis. In this section, ethical considerations were detailed and trustworthiness of the study data was also discussed in terms of credibility, dependability, confirmability, and transferability of the data. The findings obtained from this Phase I study will be presented in the next section of this chapter.

FINDINGS (PHASE I STUDY)

Introduction

This section presents the findings of the Phase I study. It details findings on the informants' characteristics, the typical living pattern with KOA, self-management of KOA, the practice of exercise, views about exercise, and preferences for learning exercise. These five major categories and the subcategories are illustrated in detail with verbatim quotes from the informants.

Characteristics of the Informants

A total of 31 community-dwelling older people who suffered from KOA were interviewed. This sample comprised 24 female and 7 male informants. Their ages ranged from 60 to 87 years, with a mean age of 76.65 years (SD = 6.56). Almost two-thirds (N = 19; 61.3%) of the informants were widowed, seven of them (22.6%) were married, four (12.9 %) were single, and only one (3.2%) was divorced. Only one (3.2%) informant was educated up to secondary level. None of the informants were working. More than half (N = 18; 58.1%) were living alone, and the remainder (N = 13; 41.9%) were living with either relatives or friends. Approximately half (N = 15; 48.4%) of the informants were supported by the Comprehensive Social Security Assistance scheme. Regarding their health history, the duration of KOA varied from 6 months to 30 years, with a mean duration of 11.19 years (SD = 7.34). The majority (N = 27; 87%) of informants had bilateral KOA. Approximately two-thirds (N = 21; 67.7%) of the informants used walking aids in daily living. The majority (N = 23; 74.2%) of the informants also had visual and/or other general medical problems such as cataract, hypertension, diabetes mellitus, or heart disease. Approximately one-third (N = 11; 35.5%) of the informants mentioned that they had a history of a fall. A brief overview of the characteristics of the informants is presented in Table 4.1.

Table 4.1. A brief overview of the characteristics of the informants

Code	Age in Years	Sex	Marital Status	Educational Level	Living Arrangements	Use of Walking Aids	Medical History	History of Fall
1	81	F	Widow	Illiterate	Alone	Yes	No	Unknown
2	75	F	Widow	Illiterate	Alone	No	Yes	Unknown
3	77	F	Widow	Primary	Alone	No	Yes	Yes
4	82	F	Widow	Illiterate	Alone	Yes	No	Yes
5	73	F	Widow	Primary	Alone	Yes	Yes	Unknown
6	74	F	Widow	Illiterate	Alone	No	Yes	Yes
7	79	F	Widow	Illiterate	Alone	Yes	Yes	Unknown
8	72	F	Widow	Primary	With family	No	Yes	Unknown
9	82	F	Widow	Illiterate	Alone	No	Yes	Yes
10	82	F	Widow	Illiterate	Alone	Yes	Yes	Unknown
11	87	M	Married	Primary	With family	Yes	Yes	Unknown
12	82	F	Single	Illiterate	With friend	Yes	Yes	Yes
13	85	F	Single	Illiterate	With friend	Yes	Yes	Unknown
14	78	F	Single	Illiterate	Alone	Yes	Yes	Unknown
15	75	F	Widow	Illiterate	Alone	Yes	Yes	Unknown
16	80	F	Widow	Illiterate	With daughter	Yes	Yes	Unknown
17	86	F	Widow	Illiterate	With family	Yes	Yes	Unknown
18	72	F	Married	Illiterate	With spouse	Yes	Yes	Yes
19	72	F	Widow	Primary	Alone	Yes	No	Yes
20	77	F	Widow	Primary	Alone	Yes	Yes	Yes
21	82	F	Widow	Illiterate	Alone	Yes	No	Unknown
22	81	F	Single	Illiterate	Alone	No	No	Yes
23	71	M	Married	Primary	With family	Yes	Yes	Unknown
24	65	M	Divorced	Primary	Alone	No	Yes	Unknown
25	73	F	Widow	Primary	With family	No	Yes	Yes
26	60	M	Married	Primary	With family	Yes	Yes	Unknown
27	87	F	Widow	Primary	With daughter	Yes	Yes	Unknown
28	67	M	Married	Primary	With family	No	Yes	Unknown
29	70	M	Married	Secondary	With family	No	No	Unknown
30	71	M	Widower	Primary	Alone	Yes	No	Unknown
31	78	F	Married	Illiterate	Alone	Yes	No	Yes

Note: F = female, M = male; Illiterate = no formal education; KOA = knee osteoarthritis.

Findings

Content data analysis of the interview data revealed five major categories: (1) the typical living pattern with KOA, (2) self-management of KOA, (3) the practice of exercise, (4) views about exercise, and (5) preferences for learning exercise.

The informants' typical living pattern with KOA referred to a similar living pattern among most of the informants that they were mainly engaged in activities of daily living and free from child-bearing or job responsibilities. However, their lives were adversely affected by the symptoms of KOA and the related physical disability. Regarding physical disability, the informants either made adjustments in their activities of daily living or obtained assistance from the home-help service. The informants also deliberately limited their own social activities.

Self-management of KOA referred to the strategies that the informants used to self-manage their knee pain due to KOA. The informants' lives were dominated by knee pain and they used various self-management strategies day-to-day to relieve the pain. The majority of informants used multiple methods to self-manage their knee pain. Exercise in general was one of the most common self-management methods adopted by the majority of informants.

In the practice of exercise, the majority of informants persistently exercised in the early morning and some of them also exercised in the afternoon. The informants' exercise habits could be described in terms of time for exercise, types of exercise, duration of exercise, venues for exercise, and equipment for exercise. If the informants continued or discontinued one type of exercise, there was always a reason behind the continuation or discontinuation of the exercise.

Regarding the informants' views about exercise, they talked about definitions of exercise, what constituted good exercise, and their perceived benefits of exercise.

The informants expressed a common definition of exercise and classified exercise into two levels depending on whether or not the exercise skills needed to be learnt from an exercise instructor. They mainly defined exercise generally without paying particular attention to specific exercises for KOA. Although exercise was identified as a self-management method for KOA by the informants, their knowledge of exercises for KOA was minimal. The informants demonstrated some consensus on the essence of good exercise. They perceived that exercise was health promoting, as this concept was constantly reinforced by people they knew and by the media. They believed that exercise could produce a soothing effect on KOA and would help slow down the deterioration of KOA.

When the informants were asked if they were interested in learning exercises for KOA, their responses revealed some conflicting thoughts. On one hand, they were interested in learning exercises for KOA, and on the other hand, they expressed some concerns about learning these exercises. The informants also expressed their preferences for the method of learning exercises for KOA.

These findings are presented by categories and subcategories as outlined in Table 4.2, and each of the categories is further illustrated in detail with the support of verbatim quotes from the informants.

Table 4.2. Categories and subcategories derived from the interview data

Categories	**Subcategories**
The typical living pattern with KOA	Activities of daily living Social activities
Self-management of KOA	
The practice of exercise	Exercise habit Continuation of exercise
Views about exercise	The definition of exercise The essence of good exercise The benefits of exercise
Preferences for learning exercise	Motivation to learn Learning method

KOA = knee osteoarthritis

The Typical Living Pattern with KOA

All the informants had a similar pattern of lifestyle. They were mainly engaged in activities of daily living as they were free from child-bearing or job responsibilities. Living with KOA, the informants had made some adjustments to their activities of daily living and they also deliberately reduced their social activities. The typical living pattern with KOA was subcategorised into: (1) activities of daily living and (2) social activities. In the following, a general description of an informant's typical day will firstly be given and then each of the subcategories will be illustrated.

The informants generally got up very early at around five or six in the morning. After their personal cleansing routine, they would exercise before having breakfast.

After breakfast, some of the informants would go shopping for food in the market while others would read the newspaper either at home or at a centre for the elderly. Then they would do some light household cleaning such as sweeping the floor and cleaning the items that they could reach easily. They might also spend some time resting and treating their knee pain before they prepared meals. However, the few informants whose KOA was severe would mainly stay at home to rest and treat their knee pain and wait to receive meals from the meals-on-wheels service.

After lunch, some informants would take a nap, but they said they usually could not fall asleep. The informants would usually have leisure or social activities in the afternoon, such as watching television programmes or listening to the radio. Some informants would go to a centre for elderly people or the park nearby, while some might chat with neighbours or take a walk. A few informants mentioned that they would play mah-jong in the afternoon. In addition, all the informants would do something to manage their knee pain since it usually became worse in the afternoon.

On certain days, some informants would schedule time to stay at home to receive the home-help service which was mainly provided during daytime.

Towards evening, the informants would take a bath and wash their clothes, and then they would have dinner; a few would receive meals from the meals-on-wheels service. They would usually watch television programmes and treat their knee pain before going to bed.

The following will provide more detailed descriptions about how the KOA affected the informants' activities of daily living and self-restricted their social activities.

Activities of Daily Living

The majority of informants (N = 19) required assistance in activities of daily living. These informants were regularly visited by home-helpers. The frequency of home-help visits for some informants whose need for assistance was great could be twice a day, while some other informants might need home-help visit for once a fortnight. In general, the informants were progressively less able to manage their usual daily activities as the KOA progressed. Although the majority of informants also had other health problems, the disabling effect of KOA was evident in the interview data. The informants modified their ways of managing daily activities such as using equipment or splitting tasks into small sections. They also took more time to complete their usual daily activities. In addition, many of them used the home-help service and a few of them also used the meals-on-wheels service. Home-helpers assisted them in heavy household chores such as cleaning the windows and kitchen, and also in difficult tasks such as changing light bulbs and retrieving heavy items from very low or very high places. The meals-on-wheels service is the meal preparation and delivery service. The following quote exemplifies how the informants modified their habits and used the home-help service in managing household chores:

> *Now I cannot clean the floor on my own as I cannot squat. If I squat, I will fall ...I am progressively unable to squat, and I once did fall onto the ground when I attempted to squat... Now I use home-helpers. They help me do all the cleaning, including cleaning the windows and the kitchen...Now I cannot stand for a long period of time [at maximum 15-20 minutes] as this is too painful for me to tolerate. For example, after meals, I cannot tolerate washing the stove and the surrounding*

area and all the dishes at one time, so I will sit for a while after I get half of the washing done, and then I will go back to finish the rest (Informant 3).

Another informant who was living alone mentioned how she dealt with the sudden burning out of a ceiling light bulb and preparing a fan or quilt for the coming change of weather in the course of using the home-help service:

Now I use home-helpers. They come once a week for an hour... Last time when my light bulb burned out, I called Ms. Tsang [the head of the home-help team] to get somebody to change it for me. Ms. Tsang asked a home-helper to help me get it changed, that is, when the home-helper was on her way to take meals to other elderly people... For the quilt on the top of the wardrobe and the stuff under the bed, I won't move them. If I want to use the fan, I tell the home-helper. If it is soon going to be very cold, I ask the home-helpers to take the quilt down when they come to do the cleaning (Informant 19).

Social Activities

The informants deliberately reduced their social activities, particularly those far away, because they had difficulties with physical mobility. For example, they had difficulties in walking for a long distance, and some of them had great difficulties in getting in and out of public transport vehicles. Their daily activity area was mainly nearby their residence.

The following quotes exemplify the informants' difficulties with physical mobility and how they deliberately restricted their social activities:

The pain has worsened. It's so painful that you don't want to straighten your leg... You feel pain whether you walk or go down stairs. I cannot walk for a long distance... Sometimes the pain is even worse; I will stay at home... Now I'm not going anywhere except to the wet market for buying food... I won't go for activities which require walking for a long distance... In the past, wherever I liked, I would go. But now, I'm no longer so free as my knees failed me (Informant 3).

It's painful; I walk with a cane when I go to the wet market... It's difficult to get on a bus, but it's even more difficult to alight from a bus, I can't... I really can't alight from a bus... I dare not join any trip. I dare not go... It's difficult to get in and out of the coach. I'm worried about my knee pain as I may not be able to walk with them. I don't want to bother other people. The condition of my knees is not stable (Informant 21).

Therefore, the informants demonstrated similar living patterns. Their activities of daily living were adjusted according to the symptoms of KOA. The majority of informants also used the home-help service to take over the physically difficult tasks. In addition, the informants' also deliberately reduced their social activities because they had difficulties in walking for a long distance and in getting in and out of public transport vehicles. Their activity areas were mainly within their residential districts.

Self-management of KOA

As the informants had to live with KOA, they used various methods to reduce pain and stiffness of the knee(s). The methods used by the informants included analgesic balm, oral analgesic medication, physical exercise, hot compresses, cold compresses, knee braces, body weight reduction, analgesic adhesive plasters, and oral supplements. In addition, other methods were used among the informants that originated from the concepts of traditional Chinese Medicine, such as the Yin-Yang theory, the flow of Qi and blood, and the network of meridians and collaterals; these methods included herbal massage oils, external application of ginger, avoidance of cold drinks, Tai Chi, acupuncture, acupressure, dietary therapy, and Chinese medicinal capsules.

The informants hoped that by means of these methods, the physical symptoms of KOA such as pain and stiffness of the knee(s) could be alleviated. They obtained information about the management of KOA from various sources, including healthcare workers, friends and relatives, books, and mass media such as radio or television programmes and newspapers.

Medical appointments were a common channel through which the informants could obtain information about the management of KOA from doctors. The informants were usually prescribed analgesic balm and oral analgesic medication by the doctor. However, they reported varying effectiveness of these analgesic prescriptions, and some informants were worried about the side-effects of the oral medications. This is exemplified by the following quote:

> *I have medical follow-ups at a hospital, and this is nothing special. They mainly give me some medicines. You know, the methyl salicylate ointment [analgesic balm] is useless. I seldom use it. Therefore, I'm not going to the pharmacy counter every time to take the prescribed medicines, as sometimes I have quite a lot of the medicines at home... The analgesic pill is better. It helps alleviate the pain for one or two days. But it just works for two days, and then I feel the pain again... You know I'm worried*

about the side-effects of the pills... They hurt my stomach. If I can bear the pain, I won't use them (Informant 26).

Some doctors would also advise the informants to do more exercise. However, according to the informants' information, details on types of exercise or how to carry out the exercise were seldom provided.

The informants therefore also sought information from other sources in addition to the limited information obtained from doctors on how to self-manage KOA. For example, one male informant described how he studied acupressure from books and mass media and tried it out on himself:

Sometimes when I'm watching television programmes, I press myself this way and that way... I like reading books about acupressure points. Therefore, I often press on the acupressure points on my body to see whether it works. Sometimes it works; sometimes it doesn't work... Sometimes there is information about acupressure points in newspapers or in television programmes. If the talk in the television programme is good, I record it and view it again when I am free ... I try to press myself this way and that way, and then I go back to read the book and try again. The book indicates the structure of your body and also the acupressure points. I follow the book to do the acupressure... I think acupressure can help promote the circulation of Qi and blood... to stop stagnation of Qi and blood... so it helps my knees (Informant 26).

Moreover, all the informants used other methods which were not prescribed by doctors to self-manage KOA. For instance, one female informant described how she used ginger, hot compresses, and herbal massage oil to treat her knee pain. She found that these methods were more effective than the analgesic balm prescribed by the doctor. She said:

> *When I feel really sore... I sometimes grind a few pieces of ginger and squeeze out the juice. Then I use the juice to massage my knee. You know, ginger can drive the 'wind' [a concept in traditional Chinese Medicine] away... I sometimes boil the ginger with some water, soak a towel in the water, and then spread the towel on my knee when it is still very hot. It helps. I pour the ginger water onto my knee when I can bear the temperature... You know, sometimes I just rub some ginger on my knee, and the swelling can be alleviated. I feel much better... If the knee is not so painful, I usually use massage oil... I use Kwan Loong Medicated Oil [a kind of herbal massage oil]... It's okay, better than not doing anything... It's better than the methyl salicylate ointment [analgesic balm] that's prescribed by the doctor* (Informant 2).

All the informants used multiple methods (i.e., three or more) to self-manage their KOA. They tried to optimize self-treatment by using multiple methods based on their knowledge, experience, and financial status, as their suffering was significant. The physical symptoms of KOA were a day-to-day matter; the informants found that they had to deal with the symptoms actively by themselves in daily living.

The following quote from a male informant exemplified the use of multiple methods to manage KOA:

> *This [analgesic balm] is quite good. I rub it on my knees and make them very hot before I go outside. It helps for a short period of time... I exercise in the morning... When I feel very sore, I take the pills prescribed by the doctor... That's not enough. You must rely on yourself. You know, I also make soup using Chinese herbs. I boil maghania macrothylla [a kind of Chinese herb] and glabrous greenbrier rhizome [a*

kind of Chinese herb] with pork and the bone. It's good for the knees. I made this soup every other day in the beginning. Later, I found that the expense was high. It's difficult for me to afford that. So I changed to making this soup just once a week. Sometimes, I also use radix notoginseng [a kind of Chinese herb] in the soup, because it helps promote blood circulation... You know, when you take cold drinks, the cold water will accumulate in your knees. Then the cold water will obstruct the blood vessels and cause pain... Sometimes, I fry some ginger in a plain wok and wrap the fried ginger in a towel, for use as a hot compress on my knees. After just a while, you will find that the ginger becomes wet, because the cold water comes out from the knees... I also use an analgesic adhesive plaster before I go to bed. Hey! I use all sorts of methods...If you have pain all the time in one of your body parts, once the pain is gone, it's more comfortable (Informant 24).

During the process of self-management, the informants tried various methods to deal with the symptoms of KOA. They experienced both the process and outcome of using each of the methods, and made comparisons between them. They found that some methods were more effective for their symptoms of KOA, and some were more convenient to be used on a regular basis. The informants eventually used these methods more often than the others.

The methods most commonly used by the informants were physical exercise and herbal massage oils. The majority of informants carried out regular exercise mainly in the early morning, and some also carried out less regular exercise in the afternoon. The majority of informants used herbal massage oils, but there was not a particular brand of herbal massage oil that they all used. They used herbal massage oil throughout a day when they felt the pain was bad. In addition, some informants would use the herbal massage oil before going to bed in order to have a better sleep.

Self-management of KOA was an integral part of the informants' lives as they suffered from constant knee pain. The informants obtained information about the management of KOA from various sources. They were generally not satisfied with the effectiveness of analgesics prescribed by doctors and worried about the side-effects of these medications. They tended to use other methods and multiple methods to self-manage KOA. The majority of these were methods that are commonly used in the Chinese community for the management of chronic musculoskeletal pain, and the rationales behind these methods were derived from the principles of traditional Chinese Medicine. The most commonly used methods among the informants for self-management of KOA were physical exercise and herbal massage oils.

The Practice of Exercise

The majority of informants in this study had developed the habit of exercising to self-manage KOA. Through engaging in regular exercise, the informants had experienced positive effects and were further motivated to continue regular exercise as they were worried that deterioration of their KOA would lead to loss of independence in self-care. Although the informants often met peers during exercise, they insisted that their determination to continue exercising regularly was not influenced by their peers. In contrast, some informants had the experience of discontinuing certain sorts of exercise for various reasons. The practice of exercise was subcategorized into: (1) exercise habit and (2) continuation of exercise.

Exercise Habit

Most of the informants engaged in regular exercise. Their exercise habit could be described in terms of time for exercise, types of exercise, duration of exercise, venues for exercise, and equipment for exercise.

Time for exercise

The informants had the habit of exercising every day, early in the morning, at around 5–7 am. This morning exercise was considered 'formal' exercise by the informants. Only two male informants also had formal exercise at another time of the day (i.e., exercise twice a day). These two informants differed from the other informants as they wanted to reduce body weight by exercising. In addition, some informants also exercised at home during the daytime, but they perceived the daytime exercise as 'informal' exercise. The informal exercise differed from the formal exercise as it was not done at a fixed time, for a fixed duration, or in a fixed sequence. It was somewhat 'ad hoc' in nature and depended on the symptoms, the time, and the mood of the informants. Some informants would also go for a stroll in the afternoon to meet and chat with other older people at the park. According to the informants, formal exercise was important, while informal exercise was less important, as exemplified by the following quote:

> *Most of the people exercise in the morning... morning exercise is the main course. For the rest of the day, it's less important, and you may exercise a bit as you like* (Informant 20).

Early morning was considered the best time for exercising. One male informant said:

Yes, I exercise in the morning. I don't normally exercise at other times, because even if I attempt to do so, once I walk, my knees will hurt again... No, no, it won't work at those times [in the afternoon or evening]. Only the morning sessions seem to be more effective. Well, I have tried. I've tried taking a walk at night, but it just doesn't work. The pain's still there... It's only the morning sessions. Perhaps it's because I have enough rest from a long night of sleep. That way I will be in better physical condition, with enough energy, you could say (Informant 23).

The informants showed determination to maintain the formal exercise. They also mentioned that their morning exercise was not affected by seasons, weather, or social activities. For example, even on rainy or stormy days, they would maintain the habit of daily morning exercise by moving to a sheltered place. This is exemplified by the following quote:

If it's raining, we can do it under the bridge... we do it all the same, be it cold winters or hot summers... yes, we go out even when typhoon signal no. 8 is hoisted (Informant 20).

They would arrange social activities in the late morning or thereafter to avoid interruption of the morning exercise. One female informant said:

I won't stop working out because of personal engagements. I'll arrange shopping and other appointments after exercise (Informant 13).

Types of exercise

The majority of informants did joint movements that included flexing limbs and trunks, swinging arms and legs, and moving the body about. They counted the movements and balanced them on both sides of the body. They developed their own exercise patterns by combining some movements designed by themselves with some movements that they learned from observing others who exercised. This development process was guided by the principles of safety and comfort. Only three informants did specific sets of exercise that were taught by exercise instructors. The informants became accustomed to their own exercise patterns, and performed more or less the same sets of exercises every morning. In addition, all the informants who exercised included walking in their morning exercise routine, while some informants would also go for strolls during the rest of the day. The following quote exemplifies the type of exercise the informants did:

> *I would walk about and exercise, swinging my arms and legs in the park. Sometimes I would follow how other people in the park exercise, and I do these exercises daily* (Informant 4).

> *I do all the sequences, and move my arms 100 times on each side... another 100 times for the waist... squat 30 times, swing my legs 30 times on each side, and then walk for the remaining time in circles... I made these sequences up myself so that I exercise all the body parts... I've made sure the exercise movements are very comfortable and safe, so that I won't get hurt... and I do the same thing every morning* (Informant 3).

Duration of exercise

The duration of the informants' morning exercise ranged from about 60 to 90 minutes. This included around 30 to 45 minutes for movements of the joints, and another 30 to 45 minutes for walking. The duration of exercise later in the day and the strolls in the afternoon varied among the informants, and ranged from 0 to about 90 minutes. This was less constant and more difficult to estimate, because the informants carried out these exercises as needed and might skip the exercise due to social events. For example, the following is a quote from a female informant about duration of exercise:

> *I go out to exercise at around 5 am, and then I come back at around 6 am... I first do my sequence, and then I walk for half an hour... during the rest of the day, I usually go out a few times for strolls ... I sometimes take naps... If the TV programme is not so attractive, I go for a stroll again... I do not have a fixed schedule. It all depends...* (Informant 25)

Venues for exercise

The majority of informants took their morning exercise at outdoor venues, mostly at the park or the space for sports within their residential district. They exercised at outdoor venues mainly for fresh air and more space. For instance, one female informant who was living in a flat of about 200 square feet said:

> *I go to the podium. The air is better outside, and I can't find a good spot in my home to exercise* (Informant 7).

The informants met friends, neighbours, or other older people at outdoor exercise venues as they said there was a culture of exercising outdoors in the early morning among older people. Moreover, most of the informants liked meeting people and enjoyed the social interaction. The culture among older people of exercising outdoors is illustrated by this quote from a female informant:

> *You can see groups and groups of people exercising at the park in the morning... quite a lot of them are older people... we're all exercising there. I sometimes get to know some of them... so you meet people and naturally you chat with them. It's quite nice... it's very casual* (Informant 28).

Equipment for exercise

None of the informants brought equipment for their morning exercise, but the majority of them made use of railings as support for movements of the legs. Over half of the informants had indicated their concerns or fears about falling, and they felt safer using railings as a support for leg movements, as exemplified by the following quote:

> *You can do some stretching and squatting against the railings. Use them as support so that you can hold on to it. Then you won't fall easily* (Informant 14).

In short, the informants had the habit of exercising every day, mainly early in the morning, which was considered by them as the best time for exercising. The majority of informants carried out joint movements which they had developed themselves. They counted and balanced the movements on both sides of the body during exercise. They perceived that their self-developed exercises were safe and comfortable. All of those who exercised took a walk during their regular exercise in the morning, while some also went for a stroll later in the day. The informants who exercised would typically spend 60 to 90 minutes exercising outdoors. They usually met and chatted with other older people at the exercise venue as there is a culture for older people to exercise outdoors in the early morning. They did not bring exercise equipment but would make use of railings as support for exercising the legs.

Continuation of Exercise

Most of the informants identified one or more positive experiences from the practice of exercise which encouraged them to continue exercising. The most frequently reported positive experience was the reduction of stiffness after exercise. A few informants also reported other positive experiences including the reduction of knee pain, and improvement of leg strength and psychological well-being. In addition, the informants stated that there was no reason for not exercising as they had plenty of free time after retirement. The informants' positive experience with exercise and their determination to exercise are exemplified by the following quote:

> *I continue exercising as I feel less stiff afterwards. The main reason is that I feel less stiff... as exercise is good for your health, why are you so lazy? Why don't you keep on doing it? I personally could not find a reason for not exercising... I do it every day* (Informant 27).

Some informants also reported that they had tested some exercise movements on themselves. They tried and experienced some movements. If it worked for them, they would continue that movement. For example, a few informants reported that squatting against railings was good for their knees. One male informant said:

I attempted it many times. I tested it myself...I squatted, squatted, squatted for a few times, and the pain was relieved! ... With that experience, I therefore make sure that I do that exercise (Informant 24).

A few informants also shared that if they disregarded the pain at the initial stage of exercise, they would feel better afterwards. One male informant said:

... [the knee joint] is still painful... but I disregard it and continue to exercise [squatting up and down], no way, because I feel better even though I still feel pain after the exercise... that is, you won't feel the spasm with the pain after the exercise. When the knees have become less stiff, the pain is different. It's less unpleasant. The feeling is better (Informant 26).

The underlying reason for continuation of exercise among the informants was related to the desire to maintain independence in self-care. The informants were aware of the degeneration of their knees and worried that if they were unable to walk, they would be physically restricted and dependent on others for activities of daily living. One female informant emphasized this:

I know my knees are degenerating, but I hope that they won't get worse. If I can't walk, it'll be too bad. Living is no longer meaningful... If I can't walk, I'll become useless and will definitely be a burden to others... Being able to walk is the most important thing to me... If you can't walk, the young may support your living expenses, but who has time to take care of you?... It's impossible for them to look after you; everyone is so busy making a living (Informant 27).

Meeting people at the exercise venue was not a factor influencing the informants' determination to exercise regularly in the morning, although most of the informants enjoyed meeting people during their exercise routine. For example, one female informant said:

> *You meet this guy today but he may not come the next day. The most important thing is all about yourself, about having the determination to go every day... although meeting people is good, it's not a factor in my determination to exercise...* (Informant 28).

Some informants mentioned that they needed to have peers around for the sake of safety, in case they sustained any injury or became unconscious during the exercise. One female informant said:

> *I have a few neighbours who also exercise outside. It's good to have people around. You know, I once wanted to throw away a piece of tissue, so I tried to search for a rubbish bin. I tripped over and fell badly during the search. Then three old neighbours grouped together to pick me up... I had fallen a few times... as we're so old, we need to keep an eye on each other... when exercising outside, you can get somebody to give you a hand if you fall* (Informant 9).

In contrast, some informants reported their previous experience of discontinuing exercise. There were different reasons for discontinuing exercise, including inability to perform the exercise, ineffectiveness of the exercise for relieving the symptoms of KOA, greater knee pain and fatigue caused by the strenuous nature of the exercise, and lack of equipment for the exercise.

For example, as the symptoms of KOA became worse, a few informants were no longer able to perform the specific set of exercises that they could and used to do in the past. For instance, one informant quitted Tai Chi because her knees became worse and she had fallen a few times. She therefore changed from practising Tai Chi to range-of-motion exercises for the sake of safety. She said:

> *I quit Tai Chi because I had fallen [four times in the previous year]... For Tai Chi, you twist your body and sometimes you stand on one leg. I feel that I am not strong enough... so I quit Tai Chi... I practise an exercise that I feel is very safe, like... I hold the railings when I swing my leg... this way... that way* (Informant 3).

Two other informants stated that they would modify or skip a difficult movement when they practised a specific set of exercises rather than discontinue the whole set of exercises, as exemplified by the following quote:

> *I practise Luk Tung Kuen [a particular set of exercises]... as I have knee pain, I won't jump... there is also a movement that requires you to stand on one leg. I could do it in the past, but now I need to hold onto railings... I avoid those unsafe movements... For the movement that causes pain, I skip it... There are 36 movements in Luk Tung Kuen... You can modify or skip some of the unsafe movements. It doesn't matter* (Informant 20).

Several other informants had some experience with discontinuing the exercise which they learnt during a course of physiotherapy. For example, one male informant discontinued the exercise that was taught in a course provided by a private physiotherapy centre because he perceived the exercise to be ineffective. He mentioned that it was a course of combining exercise and physiotherapy at a frequency of three times per week and he quitted the course at the second week. He said:

> *It's cheaper, so I signed up, and had therapy with them about four times. But then I couldn't feel the effects, so at the end I quit... didn't join them anymore* (Informant 23).

Another female informant discontinued a course of exercise which was provided by the physiotherapy department of a hospital due to the strenuous nature of the exercise. She said that she could not tolerate the pain:

> *The people at the hospital asked me to undergo physiotherapy, but I wouldn't. There's no point if undergoing therapy hurts more... I've tried it, and did it for a couple of weeks too... but I couldn't manage... It's painful; it hurt even more* (Informant 15).

Another female informant discontinued the exercise that she had learnt during a course of physiotherapy in a hospital because she did not have the proper equipment for the exercise. She stated:

> *I didn't have the proper equipment, and was therefore clumsy. I wrapped a pillow around my leg and did some kicking with it. However, even though the pillow was*

very small, it wasn't that convenient. The pillow moved out of place after a few kicks. I felt uneasy about it, and I stopped (Informant 8).

Therefore, continuation of exercise among the informants was related to whether they experienced the effect of the exercise in alleviating the symptoms of KOA. In addition, the informants' desire to maintain independence in self-care was a motivating factor underlying the continuation of exercise, while meeting with peers was not a factor influencing the majority of informants' determination to continue regular exercise. On the other hand, the reasons for discontinuation of some sorts of exercise were related to inability to perform the exercise, perceived ineffectiveness of the exercise, the strenuous nature of the exercise, or lack of equipment for the exercise.

Views about Exercise

With regard to the informants' views about exercise, the informants defined exercise very loosely and viewed exercise from a very general perspective. They did not differentiate between exercise specifically for KOA and exercise in general. The informants also expressed their views about the important elements in doing exercise. They believed that exercise was beneficial and necessary for the maintenance of good general health. When asked about the use of exercise for KOA, they answered that exercise can produce a soothing effect and help delay degeneration of the knee. Therefore, three subcategories on their views about exercise emerged from the interview data: (1) the definition of exercise, (2) the essence of good exercise, and (3) the benefits of exercise.

The Definition of Exercise

When the informants were asked about the definition of exercise during the interviews, the majority of them showed uncertainty at first. Most of them gave a loose definition of exercise. According to the informants, exercise was defined as any movement of the body. The quote below exemplifies the loose definition of exercise given by the informants:

> *Exercising is about moving about. You move your body about, or else what can you do? It's all about walking here and there* (Informant 9).

The informants further clarified that exercise could be just freely moving one's body, or it could be in the form of specific sets of movements such as Tai Chi and Luk Tung Kuen, which have to be taught by an exercise instructor. Specific sets of movements were considered by the informants as exercise of a higher level because these exercises required the participant to learn, memorize, and be able to perform the sequential movements. Only three informants in this study practised specific sets of movements. The quote below exemplifies the informants' ideas about lower and higher levels of exercise:

> *I'm talking about swinging my arms and legs, moving my body about; that's it. I'm not referring to those ... like Tai Chi, that was not so easy... that required an exercise instructor to teach you* (Informant 14).

When they were asked about their understanding of the difference between exercises in general and those for KOA, most of them showed little knowledge of the difference. The majority of informants admitted that they did not have the knowledge of exercise for KOA. They did not differentiate between exercise specifically for KOA and exercise in general. Some informants guessed that any movement of the legs was exercise for KOA. No informant mentioned the various specific exercises for KOA, such as knee range-of-motion exercises, stretching exercises, and muscle strengthening exercises. A few informants who had received physiotherapy mentioned the exercises they had learnt at physiotherapy departments as exercises for KOA. According to these informants, they learned one or two stretching or muscle-strengthening exercises from the physiotherapist. They could briefly describe the exercises, but were unable to explain their purpose or give other information about the exercises such as how did the exercise work for KOA and what type of exercise that was learning. The following quote from a female informant who had learnt a muscle-strengthening exercise for KOA in the physiotherapy department of a hospital exemplified the informants' inadequate knowledge of exercises for KOA:

> *[For the knees] I was taught to do some kicking with a sandbag... that is, I lie down with a sandbag wrapped around my ankle, and then I lift up the sandbag with my leg and hold my leg there for a count of 10. I repeat this action for 10 times on one leg, and then I repeat this action on the other leg for another 10 times... I don't know the rationale behind it... the physiotherapist didn't explain. I was simply told what to do* (Informant 15).

The Essence of Good Exercise

The informants demonstrated that they had some ideas about what constitutes good exercise. Four elements of good exercise were identified from the informants' responses. These elements were: (1) persistent practice of exercise on a daily basis,

(2) exercise of all the body parts, (3) exercise in accordance with one's ability, and (4) exercise in an environment with fresh air.

All the informants believed that determination to exercise regularly was very important, and that exercise should be carried out every day. They noticed that the benefits of exercise, such as improvement of joint flexibility, were maintained by continuous daily practice of exercise. The informants' views about the importance of determination to exercise every day are exemplified by the following quote:

> *Exercise must be in a regular fashion... one has to have determination... I think to have determination is the most important thing for exercising* (Informant 29).

> *There are a lot of exercises that you can take part in... If you have the determination, you can walk for 30 minutes every morning......and it will still be a good thing. Whatever you do, you need to have the determination to do it every day. And if you don't exercise regularly, basically you can't maintain your health. You need to make it a routine, and then you can get the benefit out of it... For example, once or twice per week is no use. You have to do it every day. You have to fix a time for it... And at least 30 minutes every session. Only then will it be effective* (Informant 23).

The majority of informants also believed that good exercise should involve every body part. They believed that movement of every body part was needed, and maximal exercise was achieved if all the body parts were moved. Their views on this aspect are exemplified by the following quote:

> *Exercise all the body parts; I move all my body parts, step by step, moving from head to feet... Exercising is to release the stiffness of joints and muscles, so you should*

move all parts of your body... Then your whole body will be feeling very flexible and relaxed, and you will be more able to do whatever you want to do (Informant 6).

Most of the informants mentioned that exercise should be carried out in accordance with one's physical ability and tolerance. They demonstrated awareness of physical deterioration due to ageing, and were very cautious about safety issues. Their emphasis on this element of good exercise is exemplified by the following quote:

Half an hour is enough. You don't have to exercise too much. You'll be feeling tired as you're already so old. You can't do it too long and you can't exercise too rigorously...you don't need others to remind you. You should be aware of your age and there are limitations... if you exercise too rigorously, you'll easily get hurt...that means you exercise according to your own physical tolerance, as long as you achieve good movement of the Qi and blood, that's good enough... keep the speed to whatever feels natural and comfortable for you... there's no point in exercising too hard. You should be very cautious for your own safety (Informant 27).

In addition, most of the informants believed that breathing was an important part of exercise. Thus, fresh air for beneficial ventilation was important. Most of the informants said that it was best to exercise in the morning, in an open space with greenery, as exemplified by the following quote:

The most ideal place is one with good air and a few people walking about. Air in the morning is better. Open space with greenery such as the park is an ideal place for exercise... Breathing is very important when you exercise (Informant 23).

The Benefits of Exercise

All the informants perceived exercise positively, and this was consistent with the message from their immediate social context. According to the informants, various sources of information consistently conveyed to them the same message that exercise was good for health. The sources of this message included healthcare professionals, mass media, friends, and relatives. They also noticed that many people exercised regularly, and it was particularly common for people to exercise at the park or in open areas in the morning. The following quotes reflect the informants' positive perceptions of exercise:

> *Many people talk about doing exercise... There are many exercise classes; you can see them at the park every morning... The doctor did encourage me to exercise... Of course, it is good to exercise. I feel healthier... Yes, exercising is good* (Informant 31).

> *Exercise, well, every doctor talks about exercise... Exercise is of course good. You have fewer diseases if you exercise... you can see many people exercising in the morning. You can easily spot them at the park... People nowadays understand the importance of exercise... Normally, the doctor will always ask if you exercise, and they say you have to exercise and so on... Well, I have always known that exercising is good...* (Informant 23)

Although the informants perceived exercise positively, they did not identify exercise as an effective treatment for KOA. Their perception of effective treatment for KOA was complete healing of the disease, which means the related physical symptoms such as pain and stiffness should disappear after healing. In addition, from the perspective of the informants, KOA was a matter of 'wear and tear' and part of the ageing process. They regarded it as a degenerative, irreversible, and incurable condition; therefore, they thought that effective treatment for KOA did not exist. Their perception of the limitation of exercise as a management strategy for KOA is exemplified by the following quote:

> *The doctor read my X-rays and said the joints were deteriorating, the softer bones were weakened... Hence, my condition... It's not like you can entirely heal it, but at the very least you can prevent the condition from worsening... Exercise in this sense can't do much in improving it. Rather, it keeps it at its present level and makes them (the knees) hurt less* (Informant 23).

Instead, most of the informants identified the benefits of exercise as being mechanical. They believed that exercise kept the joints moving; thus, the joints would not become stiff. From the informants' perspective, exercise helped maintain joint flexibility and produced a soothing effect on KOA. This is exemplified by the following quote:

> *I always think that if you don't move at all, your joints will become 'crusted' [jelled and stuck in place like oxidized iron], so I still have to move a bit... I feel less stiff... I feel better... that's why I exercise every day* (Informant 8).

Approximately half of the informants also expressed their beliefs that exercise served to promote the circulation of blood and 'Qi' inside a person's body, which helped delay deterioration of the knee. Qi is a concept in traditional Chinese

Medicine; it is a form of energy flow inside the body to nourish body cells (Ellis & Li, 1993). Nourished by the flow of Qi, that part of the body can become healthier. One female informant explained:

> *It means that for an old person, if you don't exercise, those blood vessels will get clogged. That's why you have to exercise regularly. You have to keep them working. For ageing people, if you don't exercise to maintain them, your body functions will deteriorate really quickly* (Informant 6).

Another male informant said:

> *When you exercise every morning, you will feel this Qi energy inside your body. It's shapeless, but you can feel it circulating inside... exercising can improve blood and Qi circulation. That's probably the main reason [for the knees to be less painful after exercise]* (Informant 23).

Therefore, the informants demonstrated their views about exercise, which included the definition of exercise, the essence of good exercise, and the benefits of exercise. They defined exercise loosely as any movements of the body and classified exercise into two levels. Exercise in the form of specific sets of movements was perceived as a higher level of exercise. The informants demonstrated little knowledge of exercise for KOA, but they had some consensus on what constitutes good exercise; four elements of good exercise were identified from the interview data: (1) persistent practice of exercise on a daily basis, (2) exercise of all the body parts, (3) exercise in accordance with one's ability, and (4) exercise in an environment with fresh air. The informants in general perceived that exercise was health promoting. They thought that effective treatment for KOA did not exist, since their concept of effective treatment was that which achieved complete healing. They perceived that exercise was beneficial for KOA because it helped maintain joint flexibility and produced a soothing effect. In addition, approximately half of the informants believed that exercise was beneficial for KOA by means of promoting the circulation of blood and Qi inside one's body.

Preferences for Learning Exercise

With regard to the informants' preferences for learning exercise, the informants showed motivation to learn exercises for KOA. On the other hand, they raised a number of concerns about learning exercises for KOA. In addition, they showed some consistency in their preferences for the learning method. Therefore, two subcategories were identified from the interviews: (1) motivation to learn and (2) learning methods.

Motivation to Learn

The majority of informants stated that they had great interest in learning exercises for KOA. However, they also expressed their different concerns regarding learning exercises for KOA, which could reduce their motivation to learning therapeutic exercises. Their concerns included potential time clashes with other activities, fear of pain, and concerns regarding physical and learning abilities. With regard to physical ability, the informants mainly showed concerns about their physical strength and functioning of the legs. They worried that their legs were too weak for them to perform the exercise. In relation to the physical functioning of their legs, they also worried that they would have to travel to the class venue as they had difficulties in boarding and alighting from public transport vehicles such as buses. In addition, they had concerns about the time and cost involved in travelling. With regard to learning ability, the informants mainly worried about their ability to memorize the exercises and learn by reading written materials as most of them were without formal education or just educated up to primary level. The majority of informants expressed that it would be better if the exercise was simple and light. For example, the following is a quote from a female informant who expressed her concerns about her physical ability, fear of pain, time for learning, and memory in learning exercises for KOA:

> *For those exercises that are very hard to do, I'm worried that my legs are not strong enough to do it… if it [exercise] causes pain, I may quit…I mean, I'm afraid I can't manage it… and I have concerns about time clashes with other activities… I'm also afraid that I can't memorize the exercises….* (Informant 18)

The following is another quote from a female informant who demonstrated lack of confidence in taking up exercise in relation to the severity of her KOA. She perceived herself as not strong enough to take up exercise because her legs were so weak that she had difficulties in walking a long distance or standing for a long period of time. She stated:

> *I'm unable to do much exercise…my legs are not strong enough to do much. I dare not do much… you know, I cannot walk for a long distance… I do not have much ability to exercise, as I cannot even stand for long* (Informant 4).

The informants' concerns about the need for travelling to the class venue are exemplified by the following quote from a female informant who was suffering from severe KOA:

> *The point is I can't travel... It's far and you would need to take a bus to get there. I wouldn't go because it costs to travel and it's too inconvenient. You know I can't take the bus* (Informant 7).

Learning Method

When the informants were asked about their preferences for learning arrangements (e.g., time, place, duration, frequency, instructor and mode of teaching), learning method was identified from the data. All the informants expressed that they would like to have a live demonstration of the exercise skills. Live demonstration was considered basic and important, while using other methods such as videos or booklets for supplementary information was not a concern for the informants. The preference for having live demonstration as the teaching method was consistent among the informants and exemplified by the following quote:

> *It's best if that person can come and teach a bit first. Come and demonstrate first, and then next time it wouldn't matter if there are video tapes or booklets* (Informant 17).

In addition, the majority of informants favoured group teaching, mainly because they would like to talk with other learners. They took their experience of learning exercise in their nearby community centre as a reference. Some of these informants also thought that it was impossible to have one-to-one teaching as it would be too expensive to run the exercise course. For example, one informant said:

> *If it is a class, it will save manpower for running the course. Learning in a group will be less boring as the learners can discuss the exercise among themselves, and they can chat among themselves as well* (Informant 29).

Therefore, the informants were in general motivated to learn, but they had various concerns regarding learning exercises for KOA. These included potential time clashes with other activities, fear of pain, lack of confidence about the strength and endurance of their legs, anxieties about the time, cost, and difficulties of travelling to the class venue, and lack of confidence in their ability to memorize the exercises and read written materials. Regarding the learning method, all the informants indicated a preference for live demonstration and the majority favoured group teaching as it allowed more discussion among the learners.

Summary of the Findings

In summary, a total of 31 older Chinese people with KOA were interviewed. The majority of them were older females with a low educational level. Over half of them were widowed and living alone. They were suffering from symptomatic KOA, and comorbidities were common. Approximately one-third of them had a history of falls. Five major categories emerged from the interview data. These were the typical living pattern with KOA, self-management of KOA, the practice of exercise, views about exercise, and preferences for learning exercise.

The informants had similar lifestyles, which included the need for assistance in their activities of daily living and their self-restrictions of social activities. All the informants actively engaged in day-to-day self-management of KOA and they used multiple methods to self-manage their knee pain. They obtained the information about management of KOA from various source. The most commonly used self-management methods among the informants were physical exercise and herbal massage oils. Most of the informants exercised regularly every morning and the exercise involved joint movements and walking. The informants who exercised and experienced the positive effects of exercise would continue exercising regularly. They continued to exercise because they wanted to maintain independence in self-care. Some informants had experience of discontinuing certain sorts of exercise for various reasons, including inability to continue the exercise, perceived ineffectiveness of the exercise, the strenuous nature of the exercise, and lack of equipment for the exercise. The informants' definition of exercise was loose, and the majority of informants did not have the knowledge of therapeutic exercise for KOA. According to the perceptions of the informants, exercising persistently every day on every body part in accord with an individual's physical capacity was essential for exercise to be effective. In addition, breathing fresh air was perceived by the informants as an important element during exercise. Most of the informants perceived exercise as health promoting. With regard to the informants' preferences for learning exercise, they demonstrated interest in learning exercises for KOA. However, some informants had concerns regarding time clashes with other activities, their ability to learn, and the difficulty of the exercise. They showed a consistent preference for live demonstration and group teaching as the learning method.

These findings will be discussed in the next section of this chapter, and the implications for developing an exercise programme for older Hong Kong Chinese people with KOA will be identified.

DISCUSSION AND IMPLICATIONS (PHASE I STUDY)

Introduction

The aim of the Phase I study was to explore perceptions and experiences of exercise with a group of older Chinese people with KOA in Hong Kong. The findings were used to inform client-centred considerations in the development of an exercise programme for promoting continual practice of therapeutic exercise in this group of clients. Five major categories emerged from the interview data: the typical living pattern with KOA, self-management of KOA, the practice of exercise, views about exercise, and preferences for learning exercise. This section will compare the characteristics of the informants of the Phase I study with the characteristics of the general older population and the older people with KOA in Hong Kong. This section will also discuss the major findings, which are the five major categories and each of the subcategories, in the light of previous literature. In addition, this section will also discuss the limitations of the Phase I study. Lastly, this section will identify the implications of the findings for the development of an exercise programme for promoting continual practice of therapeutic exercise in older Chinese people with KOA in Hong Kong.

Discussion

Characteristics of the Informants

The characteristics of the informants of the Phase I study are mainly similar to those of the older people with KOA in Hong Kong. For example, there were more female informants than male and this is consistent with the higher prevalence of KOA in women both locally and internationally (WHO, 2010a; Woo & Lau, 2001).

Comorbidity was common among the informants and this is also true of the general older population as well as older people with knee pain in Hong Kong (C&SD of HKSAR, 2008; Woo et al., 2009). The commonality among the informants in using walking aids and having a history of falls is comparable with the findings of previous studies in older people with KOA (Lachman et al., 1998; Swinkels, Newman, & Allain, 2009; Woo et al., 1994).

However, the findings on marital status, educational level, and living arrangements of the informants are slightly different from those in the general older population in Hong Kong. Approximately 60% of the informants were widowed and only 32% of the general older population in Hong Kong are widowed (C&SD of HKSAR, 2008). The educational level of the informants was mainly at primary or below primary level (96.7%); this is slightly lower than the educational level of the general older population in Hong Kong, of which the proportion with primary or below primary educational level is about 75% (C&SD of HKSAR, 2008). The lower educational level of the informants may be related to the risk factor of occupational activities for KOA. Occupations that require frequent exposure to digging, climbing stairs, or lifting heavy weights have shown a higher risk of KOA (Jensen, 2008; Lau et al., 2000), and the workers in these occupations are usually less educated (Lau et al., 2000). Nevertheless, the percentage of subjects who had knee pain and primary or below primary education in a large local epidemiological study was 78% (Woo et al., 2009); hence, the educational level of the informants of the Phase I study may be slightly lower than that of the average of the disease group. Previous literature has suggested that poorer knowledge of exercise may be associated with lower educational level (Hill & Bird, 2007; Hui & Morrow, 2001). Thus the informants' perception of exercise may have been influenced by their poor educational background. Over half of the informants were living alone and this is a higher proportion when compared with the figure of 13% of the general population in Hong Kong (Social Surveys Section, C&SD of HKSAR, 2009a).

In short, the informants' characteristics are mainly comparable to those of the general older population and older people with KOA in Hong Kong, except that the proportion who are widowed, less educated, and living alone is higher. The lower educational level of the informants may have influenced their perceptions of exercise. Although previous studies suggest that widowhood and living alone may result in increased vulnerability to depression (Chou, Ho, & Chi, 2006; Li, Liang, Toler, & Gu, 2005), there are few previous studies focusing on the influence of widowhood and live alone on perceptions and experiences of exercise in people with KOA. These minor differences in a few of the informants' characteristics in comparison with those of the general older population in Hong Kong will be discussed in the limitations of this Phase I study in a later part of this section.

The Typical Living Pattern with KOA

The findings on the typical living pattern with KOA identified that the majority of informants had a similar lifestyle, focusing on activities of daily living and social activities. Due to the symptoms and physical disability caused by KOA, the informants had made some adjustments in their activities of daily living and self-restrictions of social activities.

The findings regarding adjustments to activities of daily living due to increasing physical disability are consistent with the findings of previous studies in people with osteoarthritis (OA). The informants mentioned that they had modified their methods of managing daily living tasks and took more time to complete their usual daily activities. Similar findings are reported in previous studies (Baird, 2000; Hall et al., 2008). A group of informants with KOA who were going to have total knee arthroplasty reported that they had carried out some functional tasks such as meal preparation, cleaning, and yard work in a modified manner so that they could complete these tasks (Hall et al., 2008). Having difficulties in daily living tasks has also been reported by Baird (2000). The informants in Baird's study (2000) found that they took longer to do things and they described how they modified house cleaning by sitting on a stool and separating the tasks into portions.

The informants of the Phase I study used home-helpers to assist with heavy household chores and the meals-on-wheels service for meal preparation. However, these services might be less common in other countries; older people with KOA in previous studies mentioned that assistance with difficult household chores was obtained from friends and relatives (Hall et al., 2008; Maly & Krupa, 2007). This difference in the use of resources for assistance with daily functional activities may reflect differences in the immediate social context of older people with KOA between the society in Hong Kong and that in other countries. For example, the increase in nuclear households and the reducing involvement of relatives in care-giving to the elderly have been observed in recent decades in Hong Kong society (Fung & Cheng, 2010); these changes result in an increased use of resources outside of the family by the elderly in Hong Kong.

The findings of the informants' self-restrictions of social activities due to mobility limitations resulting from KOA are consistent with the findings of previous studies in older people with OA (Gignac et al., 2006; Hall et al., 2008; Maly & Krupa, 2007). For instance, Maly & Krupa (2007) found that knee pain made older people with KOA less confident or trusting of their bodies; as a result, they restricted their outdoor activity. The findings of the Phase I study also revealed that the informants had great difficulties in boarding and alighting from large vehicles. However, the geographical areas of other countries may be much larger than that of Hong Kong and the people there may drive instead of using public transport. In the study by Hall et al. (2008), the informants who had severe KOA reported that they had difficulties with long-distance journeys because they experienced pain even when just sitting for a while and could not sit driving for a long time. Hence, older people with KOA may have different experiences due to their different living environments.

Self-management of KOA

The informants used multiple methods to self-manage the symptoms of knee pain and stiffness. The constant knee pain is a major concern. The findings in previous studies have shown that older people with KOA found that their knee pain dominated their thoughts and actions, becoming central to their everyday living (Baird, 2000; Maly & Krupa, 2007). The use of multiple methods by older people with KOA to self-manage knee pain has been reported in previous studies (Kee, 1998; Kramer, Harker, & Wong, 2002; Maly & Krupa, 2007; Veitiene & Tamulaitiene, 2005).

The informants were generally not satisfied with the effectiveness of analgesics prescribed by doctors and worried about the side-effects of these medications. These findings have been frequently reported by previous studies of older people with OA (Fraenkel, Bogardus, Concato, & Wittink, 2004; Maly & Krupa, 2007; Gignac et al., 2006; Merkle & McDonald, 2009; Sale, Gignac, & Hawer, 2006). As reported by Sale et al. (2006), older people with OA were reluctant to take pain medications prescribed by doctors; when they did, they generally took them at a lower dose or frequency than prescribed. In addition, Merkle & McDonald (2009) reported that the average percentage of using traditional prescribed pain medications among the 457 older people with OA in their study was well below 50%. Moreover, troublesome side-effects and anxiety about being dependent on medication were also reported by previous studies of OA (Fraenkel, et al., 2004; Gignac et al., 2006; Maly & Krupa, 2007; Sale et al., 2006). As mentioned by Fraenkel et al. (2004), people make decisions by making trade-offs when they are faced with multiple alternatives, and older people with KOA were willing to forgo treatment effectiveness for a lower risk of adverse effects. Hence, some clients may not take pain medications as prescribed even if they find them effective, due to concerns about adverse side-effects.

The informants stated that they had to deal actively with the symptoms of KOA by themselves instead of solely relying on a doctor's prescription. They learned various self-management methods for KOA from friends and relatives, books, and mass media. The health behaviour of taking an active role in self-management has been reported in Chinese people with other chronic illnesses (Hwu, Coates, & Boore, 2001). In addition, it has been reported that taking an active role and the use of alternative methods to self-manage KOA could provide the clients with a better sense of control over the pain experience (Kee, 1998; Maly & Krupa, 2007), and this may explain the active engagement of the informants in using multiple methods to self-manage their KOA. With regard to the source of self-management knowledge, Kramer et al. (2002) reported similar findings; they found that people with arthritis obtained self-care strategies for joint pain from family and friends, and also through exposure to printed and broadcast media reports on health.

Previous studies also reported that older people with OA gleaned knowledge about pain management from peers (Kee, 1998; Maly & Krupa, 2007). In the study by Maly & Krupa (2007), the older people did not consider doctors a useful source of information, and commented that the treatment strategies provided by doctors were mainly passive, with little information on how to live with chronic knee pain, while physiotherapy was only arranged on request. Instead, they tended to rely on the sharing of experience with peers who they considered more trustworthy because of their experience of living with OA (Maly & Krupa, 2007).

Some of the self-management methods used by the informants originated from concepts in traditional Chinese Medicine. The majority of these methods such as acupressure and the use of ginger are not reported in other previous studies of people with KOA since they were mainly non-Chinese. These methods may be culture-specific and thus they are not being used by non-Chinese clients. However, some of these methods are used by Chinese clients with other chronic illnesses (Hwu et al., 2001). In studies of non-Chinese clients, other culture-specific self-management methods for KOA have been reported (Kee, 1998; Kramer et al., 2002); for instance, drinking Indian tea, rubbing alcohol on the affected joint, and taking gin containing white raisins (Kee, 1998; Kramer et al., 2002). The concept of cold as a cause of OA has been documented in a previous study of non-Chinese, in which the clients believed that cold was something that 'got into' the joint and protecting the joint 'against' the cold was important (Kee, 1998). This concept may be rooted in traditional Chinese Medicine: that OA is caused by the external climatological factors of 'wind', 'cold', and 'dampness' 'invading' the person's body (Ellis & Li, 1993; Zhong, Mi, He, Xu, & Quan, 2006). The concept of cold may also explain the more frequent use of heat than cold in the self-care of older people with OA (Kee, 1998; Veitiene & Tamulaitiene, 2005).

The informants tended to use convenient and effective methods, and the methods most commonly used by them were herbal massage oils and physical exercise. The action of massage is frequently adopted by older people with KOA because it provides a soothing effect (Baird, 2000), and it is common for them to use topical substances in massage, both those prescribed by a doctor and those they have purchased themselves (Kee, 1998; Kramer et al., 2002; Merkle & McDonald, 2009). With regard to the use of exercise as a self-management method, Veitiene & Tamulaitiene (2005) compared the use of assistive devices, exercise, joint protection skills, heat, rest, splints, and cold in older people with arthritis. Exercise was reported as the second most commonly used self-management method in the participants with OA, and it was considered the most effective management method by more than half of the participants (55.7%) (Veitiene & Tamulaitiene, 2005). However, these findings should be read with caution as there were only 23 participants with OA in this survey study and the participants were recruited from a rehabilitation centre. Hence, the results may be biased towards a higher rate of using exercise as a self-management method. Nevertheless, the use of exercise as a self-management method in older people with KOA has been reported in other previous studies (Kee, 1998; Kramer et al., 2002; Merkle & McDonald, 2009).

The Practice of Exercise

The practice of exercise refers to the informants' practice of exercise and the reasons behind their ongoing engagement in exercise. The findings showed that the majority of informants had developed the habit of exercising and they mainly carried out exercise in the morning at outdoor venues. However, their regular exercise in the morning had not paid specific attention to their KOA according to their detail description of the type of exercise they did. The majority of the informants reported reduction of stiffness in their experience with the exercise's effect; however, therapeutic exercise for KOA has been suggested to be also effective in reduction of knee pain and improvement of physical function (Bosomworth, 2009). Therefore, these exercises might not be as effective as those prescribed by healthcare professionals because the exercise principles of overload and specificity were not achieved (Ehrman et al., 2010). If the informants had continued or discontinued an exercise, they had a reason for doing so.

Those informants who exercised mainly carried out exercise in the early morning. Since early morning is the beginning of a day, it may favour exercising. It may also be part of local culture to carry out exercise in the morning; as mentioned by the informants, it is not difficult to see groups and groups of people exercising in parks or open areas in the morning in Hong Kong. It may also be part of Chinese culture, as exercising in the early morning has also been reported in another study of Chinese with chronic illness in Taiwan (Hwu et al., 2001). In a study by Focht, Gauvin, & Rejeski (2004), it was found that positive engagement, revitalization, and tranquillity were at their peak in the early morning in older people with KOA. It was also found that these pleasant emotional states were positively associated with the participants' perceived physical function and general health perceptions, while higher average levels of pleasant emotional states were associated with lower feelings of physical exhaustion (Focht et al., 2004). As prior exercise behaviour is a predictor for exercise adherence (Minor & Brown, 1993; Rejeski et al., 1997), the exercise habit revealed among the informants may be a favourable factor for their future continual engagement in exercise for KOA. The prescription of therapeutic exercises for KOA may be designed to as an integral part of the client's morning exercise in order to facilitate their adherence to the exercises.

The majority of the informants mainly carried out joint movements and walking in their exercise routine; they counted and balanced the number of movements on both sides of the body. The duration of exercise was typically not more than one and a half hours. These findings are highly specific and have not been reported in previous studies. However, these findings can be used in the design of exercise for this group of clients and such considerations may promote the clients' adherence to exercise.

The informants were usually exercising outdoors and one of the factors related to this habit may be the feeling of social support. As reported by the informants, they always had peers around when they exercised outdoors in the morning, and they enjoyed meeting and chatting with them. Social support as a motivational factor for exercise has been reported in the literature (Damush et al., 2005; Hendry, Williams, Markland, Wilkinson, & Maddison, 2006; Litt, Kleppinger, & Judge, 2002). Previous studies have shown that people with OA appreciate being accompanied by peers and meeting others whilst exercising (Hendry et al., 2006). Litt et al. (2002) reported that social support for exercise rather than social support in general predicted maintenance of exercise behaviour at 12 months after an exercise class in older women with low bone density. However, the majority of informants of this Phase I study stated that meeting peers at the exercise venue was not a factor influencing their determination to exercise every day in the morning. Hence, social support was not a core factor for the informants' continual practice of exercise even though they enjoyed meeting peers whilst exercising.

In addition, the informants explained that exercising outdoors provided fresher air and more space. The habit of exercising outdoors for fresher air was reported in a study of the health behaviour of Chinese people with chronic illness (Hwu et al., 2001). In this way, the exerciser will breathe in air with the smell of plants to refresh his body and mind. Fresh air was considered as an essential element for good exercise by the informants and this will be discussed in a later part of this discussion section. Since the limited space in an apartment in Hong Kong is well known, exercising outdoors for more space is justified.

With regard to the equipment for exercise, it was very common among the informants to make use of railings as support for movements of the legs. This exercise behaviour is likely to be related to safety concerns among the informants. The informants had reported that they would develop exercise that was safe and comfortable; in addition, approximately one-third of the informants had a history of falls. Therefore, the use of railings in exercise is seen as a strategy for prevention of falls. As reported in the literature, incidents of falls are common among older people with KOA and fear of falling is prevalent among them (Lachman et al., 1998). Older people with OA will make various adjustments in their activities of daily living to avoid falls (Baird, 2000). In Hong Kong, railings are one of the most common facilities in parks and outdoor or residential areas. Therefore, using railings for support for exercise is convenient and hence it is a common exercise behaviour used for prevention of falls among older people with KOA. With regard to the design of the exercise programme, the client's concerns about safety should be addressed in the exercise prescription. Otherwise, it is unlikely they will adhere to the prescribed exercises.

The informants' continuation of exercise was found to be related to their experience of the effects of exercise. This finding is consistent and highly evident in previous studies (Campbell et al., 2001; Damush et al., 2005; Hendry et al., 2006; Kee, 1998; Minor & Brown, 1993; Thorstensson, Roos, Petersson, & Arvidsson, 2006), that positive effects from the practice of exercise are likely to encourage continuation of exercise and vice versa. Despite the general recommendations of exercise to older people with KOA, experiencing the positive effects of exercise on health is important for the informants to connect the knowledge with the experience of exercise in order to reinforce their beliefs and their motivation to continue exercising (Thorstensson et al., 2006). In addition, it is important to anticipate premature discontinuation of exercise due to perceived ineffectiveness of the exercise. This may be prevented by educating the older people with KOA the knowledge about the duration required for experiencing the effects of exercise.

In addition, the informants' desire to maintain independence in self-care was found to be related to their continuation of exercise. According to the literature, older people with OA who are living with difficulties in doing day-to-day tasks tend to have various negative emotions such as frustration, anger, embarrassment, sadness, helplessness, anxiety, depression, and fear about the future (Baird, 1998; Gignac et al., 2006; Hall et al., 2008). In addition, older people with KOA had linked self-perception with mobility limitations and they would devalue their self-worth due to being dependent on others for some daily activities (Maly & Krupa, 2007). Therefore, older people with KOA are probably more motivated to participate in health-promoting activities in order to sustain physical independence; as reported by Campbell et al. (2001), the perceived severity of KOA was an important factor in motivation to exercise. The strong desire to be independent leads to the determination among older people with OA to engage in exercise (Campbell et al., 2001; Hendry et al., 2006; Kee, 1998; Victor, Ross, & Axford, 2004). Nevertheless, the literature also suggests that some older people with OA may present in the opposite way, choosing to give up and accept their limitations (Hendry et al., 2006). This attitude was not found among the informants in this Phase I study.

On the other hand, the reasons for the informants' discontinuation of an exercise could be their inability to continue the exercise. Some informants reported that they had discontinued or modified the specific set of exercises that they used to do. As KOA progressed, loss of exercise habit was found among the clients. For example, one informant in the study by Hall et al. (2008) reported that he used to curl a lot in the past but knee pain caused him to give up curling.

Another reason for the informants' discontinuation of an exercise was the strenuous nature of the exercise, as it would cause greater knee pain and fatigue. Discontinuation of exercise due to increased knee pain has been reported by previous exercise intervention studies (Lange et al., 2008; Liu & Latham, 2009). However, people with KOA may tolerate pain and discomfort because of their knowledge of the benefits of exercise (Thorstensson et al., 2006). As reported in the findings of this Phase I study, a few informants would disregard the initial pain as they had experienced subsequent improvement. Hence, educating older people with KOA about exercise, such as the benefits of exercise and the delay in experiencing the benefits, may support their tolerance of the initial knee pain and fatigue in the course of exercise (Marks & Allegrante, 2005).

With regard to the reason of lack of equipment, this point should be considered in the exercise prescription for older people with KOA. Use of resistant rubber band for exercise in exercise treatments to clients with KOA has a history of more than 10 years (Deyle et al., 2000; Thomas et al., 2002). Resistant rubber band for exercise has been chosen for teaching older people with KOA because it is handy, it can be purchase in sports department store, and it consists of various levels of resistance to match the need of the clients. The clients can carry it to various sites and they can replace it by self-purchase.

Views about Exercise

Views about exercise that emerged included the definition of exercise, the essence of good exercise, and the benefits of exercise. The informants showed uncertainty and gave loose definitions of exercise. They demonstrated a lack of knowledge about exercise for KOA. Nevertheless, the informants possessed some beliefs about the elements of good exercise and these beliefs were found to be consistent with their practice of exercise. They perceived exercise to be beneficial to health and thought that exercise had a mechanical benefit as well as promoting blood and 'Qi' circulation.

The informants defined exercise loosely and demonstrated little knowledge of therapeutic exercise for KOA. A few informants had previously received physiotherapy for KOA but still showed a lack of understanding of the purpose and types of therapeutic exercise for KOA. A lack of knowledge about exercise among people with OA was also revealed in the study by Hall et al. (2008). The lack of knowledge about exercise among the informants may be related to their background of limited education. As reported in previous studies, the relationship between educational level and knowledge of exercise is a linear relationship, so people with a lower educational level would demonstrate less knowledge of exercise (Hill & Bird, 2007; Hui & Morrow, 2001). The educational level of the general older population in

Hong Kong is low, with about 75% having a primary or below primary educational level (C&SD of HKSAR, 2008). Hence, there is a need to educate older people with KOA in Hong Kong about therapeutic exercise for KOA in order to promote their take-up of therapeutic exercise for KOA.

The informants identified four essential elements in achieving the beneficial effects of exercise. These elements were: (1) persistent practice of exercise on a daily basis, (2) exercise of all parts of the body, (3) exercise in accordance with one's ability, and (4) exercise in an environment with fresh air. Their beliefs in these elements were demonstrated in their practice of exercise. For example, the informants had developed exercise habits which were practised on a daily basis. They also developed joint movement exercises that involved every part of the body. Their exercise was mainly mild in intensity so that they felt safe and comfortable. In addition, they chose to exercise at outdoor venues for fresher air. Hence, their beliefs were consistent with their actions, a relationship proposed in the Health Belief Model (Rosenstock, 1974). In the Health Belief Model, Rosenstock (1974) suggests that a relationship exists between a person's beliefs and actions. However, the relationship may not be straightforward and there may be some modifying factors influencing the person's final actions (Rosenstock, 1974). Nevertheless, such a belief and action relationship was demonstrated by the majority of informants in this Phase I study. Hence, it is important to match the prescription of therapeutic exercises for KOA with the client's beliefs about exercise in order to facilitate their adherence to the exercises.

The informants' perceptions of the importance of practising exercise persistently on a daily basis are consistent with the message from the local primary health care branch that encourages all adults to exercise every day (Department of

Health of HKSAR, 2008). In addition, some previous studies have also reported the perceptions of demanding daily exercise in people with KOA (Thorstensson et al., 2006; Victor et al., 2004). Moreover, these perceptions may also reflect the values and beliefs regarding effort and hard work among Chinese (Leung, 2010). The emphasis on effort and hard work is rooted in Chinese philosophy, especially Confucianism (Leung, 2010). Chinese put a high value on making effort and believe that it is the most important element influencing one's ultimate achievements (Leung, 2010).

Regarding the informants' views about the need to exercise all parts of the body, this may be related to their experience of the effects of exercise. In addition, this may also be related to the cultural influence of the philosophies of Taoism and Confucianism; Chinese tend to think and act holistically, believing that nothing exists in isolation and that things are interconnected with each other (Ji, Lee, & Guo, 2010). Thus, Chinese tend to embrace all the related or contextual elements rather than isolate the different parts in dealing with a matter (Ji et al., 2010). This holistic approach in thinking may explain the informants' emphasis on exercising all parts of the body as an essential element for good exercise rather than focusing on exercising the lower body for KOA.

Exercise in accordance with one's ability is a common concern of older people. Previous studies suggest that people with KOA tend to perceive themselves as unable to do much exercise; that is, they tend to perceive themselves as having a general lack of physical fitness which they sometimes attribute to their old age or comorbidities (Hendry et al., 2006). In addition, under the influence of Taoism, Chinese would emphasize harmony with nature (Cheng, Lo, & Chio, 2010). In this sense, exercise in accordance with one's ability is to maintain harmony with one's physical capacity rather than exercise personal manipulation over one's physical capacity in exercising (Cheng et al., 2010).

The perception about exercising at a location with fresh air has not particularly been highlighted in previous studies of OA; instead, various locations, including home, outdoors, and the gym were mentioned as preferred exercise locations by people with OA in one previous study (Hendry et al., 2006). Exercising at a location with fresher air may be related to the culture of harmony and merging with nature that is rooted in Taoism (Hwu et al., 2001; Leung, 2010). In addition, the Chinese also believe that 'great Qi', which is one form of Qi in the concepts of traditional Chinese Medicine, is acquired by drawing air in through the lungs (Ellis & Li, 1993). This may explain the informants' emphasis on breathing in fresh air as an essential element for good exercise.

All the informants perceived exercise positively and this was consistent with and related to the message from health care professionals as well as their immediate social context. According to Wallace & Lahti (2005), societal values and beliefs about exercise influence older people's beliefs and motivation to engage in exercise activities. Positive perceptions towards exercise were also reported by older people with OA in other ethnic groups (Kee, 1998). The positive attitude of the informants towards exercise reflected the value they placed on exercise, and this is associated with participation in exercise activities (Gecht, Connell, Singcore, & Prohaska, 1996; Wallace & Lahti, 2005). This association is evident in the findings of this Phase I study; since the informants perceived that exercise was beneficial to health, they also participated in morning exercise regularly.

The informants perceived that KOA was a matter of 'wear and tear' and part of the ageing process. Similar perceptions have been reported by older people with

OA in previous studies (Appelt, Burant, Siminoff, Kwoh, & Ibrahim, 2007; Campbell et al., 2001; Dickson & Kim, 2003; Hendry et al., 2006; Kee 1998). For example, in the study by Appelt et al. (2007), the older adults were more likely to believe that arthritis was a natural part of growing old and that people should expect to be unable to walk and able to bear pain when they got older. The informants of this Phase I study believed that KOA was a degenerative, irreversible, and incurable condition and thus they perceived that exercise was not an effective treatment for KOA; for them, 'effective' meant complete healing. The perception regarding the cause of KOA may influence the perception about benefits of exercise (Campbell et al., 2001; Hendry et al., 2006). Older people with KOA may worry that exercise is wearing out their joints (Hendry et al., 2006). In addition, the belief that there is no curative treatment may make older people with KOA less likely to comply with an exercise regimen (Campbell et al., 2001; Thorstensson et al., 2006). However, in the study by Campbell et al. (2001), it was found that some clients thought in another way; some clients thought that they could minimize the impact of arthritis by exercising although there was no cure for it. In addition, it was found that these clients were those with a high potential to continue to comply with the exercise regimen. Therefore, older people with KOA who perceive KOA as a degenerative and incurable disease may or may not comply with an exercise regimen.

The informants expressed their views that the beneficial effects of exercise are mechanical and about half of them also believed that exercise could improve the movement of Qi and blood in the body. These beliefs are supported to some extent by the literature. For example, moving a joint to its full range is useful for nurturing the joint and maintaining its flexibility (O'Grady et al., 2000). In addition, exercise which involves neuro-musculoskeletal activities can increase the metabolic rate and blood circulation (Ehrman et al., 2010). Furthermore, exercise is beneficial to the flow of Qi in the body (McCaffrey & Fowler, 2003; Schnauzer, 2006; Ellis & Li, 1993). In traditional Chinese Medicine, Qi is defined as the basic life energy; it is invisible but vital to life (McCaffrey & Fowler, 2003; Ellis & Li, 1993). The existence of Qi has been proven by scientific methods (Shinnick, 2006). For people with KOA, the cause of knee pain is due to the stagnation of Qi and blood in the knee (Ellis & Li, 1993; Zhong et al., 2006). Hence, exercise is beneficial to KOA from the perspective of traditional Chinese Medicine.

Preferences for Learning Exercise

Preferences for learning exercise refer to the informants' motivation to learn exercises for KOA and their preferences for the learning method. The informants were motivated to learn exercises for KOA but expressed some concerns about it. Their concerns included potential time clashes with other activities, fear of pain, and the adequacy of their physical and learning ability. With regard to the learning method, they favoured live demonstration and group teaching.

The informants showed interest in learning exercises for KOA and this is consistent with their positive attitude towards exercise; the relationship between positive attitude and motivation to learn exercise in older people has been supported by the literature (Wallace & Lahti, 2005). The concern about time clashes with other activities may reflect the informants' priorities for learning exercises for KOA (Hendry et al., 2006); it was also a reason for discontinuing an exercise regimen as reported by the participants in a previous study (Campbell et al., 2001). A flexible time arrangement for exercise classes may reduce the barriers to learning exercise. Fear of pain has been identified as a barrier to exercise in people with KOA

(Fitzgerald, 2005), and reduced physical capacity has also been mentioned in the literature as a factor affecting older adults in learning exercise (Coe & Fiatarone-Singh, 2010). In addition, learning ability in relation to poor memory has also been a common factor affecting the learning of older adults (Coe & Fiatarone-Singh, 2010; Eng & Ronaldson, 2009). Therefore, these factors should be considered in the development of exercise programmes. For example, using a progressive approach in exercise programmes for teaching exercise movements may overcome memory problems and promote older adults' adaptation and confidence in learning the exercises. In addition, as mentioned by the informants, teaching simple and light exercises may also help overcome the problems of memory, physical capacity, and fear of pain. The literature on exercise interventions has supported the theory that a low to moderate level of exercise is adequate to produce positive effects on the reduction of knee pain in clients with KOA (Bosomworth, 2009; Liu & Latham, 2009). Hence, it may be appropriate to prescribe a low to moderate level of exercise in exercise programmes for older people with KOA. In relation to physical ability, the informants expressed concerns about travelling to the exercise venue as they had mobility limitations. Thus, a distant exercise venue may constitute a barrier to older people with KOA participating in an exercise programme (Baird, 2000; Kee, 1998; Maly & Krupa, 2007).

Regarding learning methods, the majority of informants expressed a preference for learning through live demonstration and group teaching. Live demonstration is important for the older learners to build up confidence for exercise, because clear instruction on how to exercise can alleviate the anxiety about doing something wrong (Thorstensson et al., 2006). Group learning provides a venue for social support for exercise and has been supported by previous studies as a motivational factor for exercise (Damush et al., 2005; Hendry et al., 2006; Litt et al., 2002). Hence, these preferences for learning methods should be considered in the development of exercise programmes.

Limitations of the Study

The findings of this Phase I study must be interpreted in view of several limitations. First, although sampling of settings had been appropriately conducted, characteristics of the service users of the settings presented limitations. In comparison with the general older population in Hong Kong, a greater proportion of the informants in this Phase I study were found to be widowed, living alone, and uneducated or educated only to primary level. Although generalizability of the study findings was not a fundamental purpose of this Phase I study, the characteristics of the informants could limit the breadth of understanding of the perceptions and experiences of exercise in older Chinese people with KOA in Hong Kong.

Second, the credibility of the interview data could have been affected by the trustworthiness of the interviewer to the informants. In this Phase I study, the informants were referred to the researcher by the health/social worker who was providing service to the informants. Thus the researcher might gain trust of the informants' indirectly through the health/social worker. In addition, the researcher used a number of methods to enhance her trustworthiness to the informants, including contacting the informant by phone, introducing herself and explaining the study before conducting the interview. However, the interview was carried out at the first face-to-face meeting between the interviewer (the researcher) and the informant. It was still difficult to fully establish a trusting relationship between the researcher and the informant.

Third, possible biases in data analysis might exist as the methods used by the researcher for minimizing biases in data analysis were mainly some checking procedures performed by her alone. In addition, the cross-checking of coding and categories with another researcher was limited to two pieces of transcriptions. Confirmation of the findings and conclusion drawn from the interview data had not also been obtained from the informants.

Finally, the study findings were limited solely to interview data. Although the researcher had observed the physical living environment of the informants while travelling to their homes for the interviews, a systematic collection of observational data for the exercise habits of the informants, as well as the physical environment and facilities of their residential districts, may further enhance the understanding of their experience of exercise. Nevertheless, as the researcher is a local person, her personal knowledge and experience of the people and residential environment in Hong Kong may assist her understanding of the experience of exercise of the informants in this Phase I study.

Summary of the Discussion

In summary, the informants' characteristics were mainly similar to those of the larger older population with KOA. A slightly higher proportion of older people who were widowed, less educated, and living alone was noted when the informants were compared with the general older population in Hong Kong.

With regard to the typical living pattern with KOA, older people with KOA experienced difficulties in their activities of daily living and they tended to self-restrict their social activities. The majority of these findings are consistent with the findings in previous studies. However, the use of home-helpers to assist with heavy household chores and the meals-on-wheels service for meal preparation found in this study is different from that reported in the literature. In addition, the differences in geographical areas and common transportations between overseas and Hong Kong could result in different transportation difficulties although self-restrictions of social activities have been reported in previous studies.

Self-management of KOA revealed the use of multiple methods to self-manage KOA among the informants. They also tended to reduce or omit the analgesics prescribed by doctors as they worried about side-effects, but they learned to use other methods to self-manage KOA. The majority of these findings are consistent with the findings in previous studies. However, some differences are noted in comparisons of these findings that may be attributed to the different socio-cultural context of the clients. For example, the use of self-management methods originating from concepts in traditional Chinese Medicine by the Chinese informants of this Phase I study is less often reported by the non-Chinese clients with OA in previous studies.

The practice of exercise was evident among the informants as the majority had developed the habit of exercising. Exercising in the morning outdoors and use of railings as support in exercising to some extent are supported by the literature. However, the details of types of exercise, duration of exercise, and exercising outdoors for more space are specific to older Chinese people with KOA in Hong Kong and have not been reported in previous studies. The informants' reasons for continuation or discontinuation of an exercise are supported by previous findings.

Views about exercise showed that there was a general lack of knowledge about therapeutic exercise for KOA among the informants and this may be related to their low educational level. The informants' perceptions of the essential elements of good exercise are consistent with their exercise behaviour. Their perceptions may be influenced by the Chinese philosophies and the principles of traditional Chinese Medicine. The informants in general perceived exercise positively and this may be a result of the persistent message from their immediate social context. Regarding the informants' beliefs about the degenerative nature of KOA, similar findings are noted in people with KOA in previous studies. However, the informants' views about exercise in terms of mechanical effects and the promotion of blood and Qi circulation are not reported in previous studies of KOA.

The findings of preferences for learning exercise suggested that the informants were motivated to learn exercises for KOA but they had some concerns. In addition, they expressed a preference to learn by live demonstration and group teaching. The findings are supported by the literature, and the informants' anxieties about learning exercise are consistent with the findings in previous studies. Lastly, interpretation of the Phase I study findings should be cautious in view of its limitations regarding the characteristics of the informants, interview at the first meeting and the possible biases in data analysis.

Implications for Developing Exercise Programmes

The findings of the Phase I study have provided important information for developing exercise programmes for older Chinese people with KOA in Hong Kong. Several implications are identified from the study findings. First, a favourable context for learning therapeutic exercises for KOA and integrating them into daily living in older Chinese people with KOA in Hong Kong has been indicated. Second, an educational need for the knowledge and skills of therapeutic exercises for KOA in this group of clients has been implied. Lastly, implications for the content of exercise programmes, prescription of exercise movements, and arrangements of exercise programmes for this group of clients have been revealed. Each of these implications will be elaborated in the following section.

A Favourable Context

The living context of the informants is favourable for learning and maintaining therapeutic exercises for KOA. First, physical exercise was one of the most commonly used self-management methods for KOA among the informants. It already co-existed with the other self-management methods for KOA; hence therapeutic exercises for KOA may be adopted and may co-exist with other self-management methods for KOA. In addition, the informants had already developed the habit of exercising in the morning, hence their ability to maintain exercise in daily living (Minor & Brown, 1993; Rejeski et al., 1997). Moreover, as reported by the informants, many people would exercise in the morning and they could meet neighbours and friends when they were exercising at parks or other outdoor venues in their residential districts; hence a favourable social context exists for older Chinese people with KOA to maintain therapeutic exercise for KOA in their daily living (Damush et al., 2005; Hendry et al., 2006; Litt et al., 2002).

Furthermore, the informants' views about exercise and their strong desire for independence in self-care have provided them with a favourable psychological context for learning and maintaining therapeutic exercises for KOA (Wallace & Lahti, 2005). The informants' positive perceptions and personal experiences of the benefits of exercise have established a favourable cognitive and affective tendency to learn therapeutic exercises for KOA. In addition, the informants' beliefs about the importance of exercising regularly on every day and their determination towards persistent practice of exercise also enhance their likelihood of maintaining therapeutic exercise for KOA. Moreover, the strong desire to maintain independence in self-care motivated the informants to engage in ongoing exercise. More importantly, the informants showed interest in learning therapeutic exercises for KOA.

Need for Education about Exercise

An educational component for the knowledge and skills of therapeutic exercises for KOA was implied from the interview findings. The beliefs about the cause of KOA as a matter of 'wear and tear' imply the informants' disregard of the biomechanical aetiopathophysiology of KOA and the problem of muscle weakness of the periarticular muscles (Bennell et al., 2008; Brandt et al., 2008). The majority of informants admitted that they did not have the knowledge of exercise for KOA. The loose definition of exercise and the failure to articulate more information about exercise or differentiate between exercise in general and exercises for KOA among the informants further demonstrated a lack of knowledge about therapeutic exercises for KOA. In addition, the type of exercise that the majority of informants were in the habit of doing was freely flexing the limbs and trunk; this also suggests a lack of knowledge and skills regarding therapeutic exercises for KOA. Moreover, a few informants who had received physiotherapy were still unable to explain the purpose of therapeutic exercise for KOA or give other information about it. Lastly, the fact that some informants described how they used trial and error to test exercise movements themselves may also imply a lack of theoretical knowledge of exercise. Therefore, the findings imply a need for improving the understanding of the role of exercise in KOA and also the various therapeutic exercises for KOA among older

Chinese people with KOA in Hong Kong. Better knowledge and skills regarding therapeutic exercises for KOA is likely to be conducive to the implementation and maintenance of therapeutic exercises for KOA by older Chinese people with KOA in Hong Kong (Wallace & Lahti, 2005).

Implications for the Content of Exercise Programmes

A general introduction to the cause of KOA, the role of exercise in KOA, knowledge and skills of therapeutic exercises for KOA, group sharing of self-practice of the learnt exercises in daily living, and supplementary information for self-revision of the learnt exercises are indicated from the findings of the Phase I study.

The need for a general introduction to the cause of KOA is implied from the interview data for the content of exercise programmes for older Chinese people with KOA. As the informants' understanding of the cause of KOA was limited to the concept of 'wear and tear', a general introduction to the cause of KOA may improve their knowledge of KOA and provide a background for understanding the role of exercise in KOA. In addition, the interview data showed that concepts in traditional Chinese Medicine were well accepted by the informants. Therefore, including the concepts in traditional Chinese Medicine regarding the cause of KOA in the content may enhance acceptance of the information in the exercise programme by older Chinese people with KOA.

The need for information about the role of exercise in KOA and knowledge and skills of therapeutic exercises for KOA, including the duration required for experiencing the therapeutic effect of exercise, is implied from the interview data. As mentioned earlier, the informants demonstrated a lack of knowledge about the role of exercise in KOA and therapeutic exercises for KOA. Thus, there is a need to improve their understanding of the role of exercise, such as the effect of training periarticular muscles in KOA and the need for improving cardiovascular function in older people with KOA (Ehrman et al., 2010). In addition, as some informants had discontinued exercise due to the perceived ineffectiveness of the exercise, this may imply a need to include information about the duration required for experiencing the therapeutic effect of the learnt exercises. This may assist older Chinese people with KOA to have realistic expectations of therapeutic exercises for KOA. This may also help them to avoid premature discontinuation of the therapeutic exercises (Damush et al., 2005).

The need for group sharing sessions of self-practice of the learnt exercise in daily living and supplementary information is implied from the interview data. The informants perceived that a group teaching method could provide a venue to discuss the learnt exercises; hence, including some group sharing sessions for discussing the practice of the newly learnt exercises may increase the acceptance of the exercise programme by older Chinese people with KOA (Damush et al., 2005; Litt et al., 2002). Moreover, as time clashes with other activities was a concern mentioned by the informants, group sharing sessions may facilitate older Chinese people with KOA to discuss how to integrate the learnt exercises into their daily living. The informants had mentioned poor memory as a concern for learning new exercises. Therefore, provision of supplementary information is indicated for the content of exercise programmes.

Implications for Exercise Prescription

Implications for exercise prescription in exercise programmes for older Chinese people with KOA in Hong Kong are obtained from the interview data. In addition to the therapeutic effects of the prescribed exercise, implications for types of exercise, intensity of exercise, duration of exercise, and frequency of exercise are identified.

On the whole, the fundamental purpose of therapeutic exercise for KOA is to produce positive effects on reducing the symptoms of KOA (Moskowitz et al., 2007). In addition, perceived ineffectiveness of exercise as a reason for discontinuation of exercise was revealed from the findings of the Phase I study. Therefore, exercises to be prescribed to older Chinese people with KOA should have empirical evidence supporting their effectiveness for KOA.

The findings of the Phase I study have implied a number of considerations in the types of exercises to be prescribed to older Chinese people with KOA in Hong Kong. According to the recommendation of the American College of Rheumatology (ACR) (2008), Arthritis Foundation (AF) (2008) and several guidelines for people with hip or knee OA (Hochberg et al., 1995; Roddy et al., 2005a; Zhang et al., 2008), aerobic exercise, strengthening exercise and flexibility exercise should be recommended to people with KOA. However, the design of these exercises (i.e., how to perform these exercises) could have variations. First of all, the design in types of exercise to be prescribed should fit into the exercise habits of older Chinese people with KOA and also match with their views about the essence of good exercise. The findings of the Phase I study showed that most of the older Chinese people with KOA had the habit of exercising at outdoor venues and they perceived that exercise in an environment with fresh air was an essential element of good exercise. Hence, prescribing exercise that can be implemented at outdoor venues is likely to increase the continual practice of the exercises by this group of clients. For example, exercises to be performed in a lying position are not practical for exercising at outdoor venues. The findings also revealed that the informants perceived exercise of all parts of the body as another essential element of good exercise. Therefore, an exercise may be considered if it can be introduced to the clients as part of exercise for the whole body and they can keep some movements from their usual exercise. The informants' habit of counting and balancing the number of movements on both sides of the body can be a reference for the design in types of exercise; they may find it easier to take up the therapeutic exercises for KOA and fit them into their exercise habit.

In addition, simplicity of the exercise and the perception that the exercise is safe are also important considerations in prescribing types of exercise for older Chinese people with KOA in Hong Kong. The informants of the Phase I study expressed concerns about their ability to memorize exercises and wanted to learn simple exercises. In addition, the simple exercises already practised by the majority of informants may also reflect the appropriateness of prescribing simple exercises for older Chinese people with KOA in Hong Kong. From the findings of the Phase I study, it was found that safety was a guiding principle for the development of exercise among the informants. In fact, one-third of the informants had a history of falls, which was also a reason a few of the informants gave for modifying or giving up exercise. Therefore, the types of exercise to be prescribed to older Chinese people with KOA should be perceived as safe for implementation, otherwise they may not practise the exercise. For example, as the majority of informants made use of railings as supports for leg movements, exercises done with supports or in a sitting position may provide a sense of safety and this may encourage the clients to put them into practice.

The findings of the Phase I study indicate a relatively low intensity of exercise for older Chinese people with KOA. For instance, the informants perceived that exercise in accordance with one's ability was an essential element of good exercise, while they showed concern about the difficulty of the exercise if they were going to learn new exercises. In addition, the intensity of the informants' usual exercise was not vigorous. Moreover, the strenuous nature of exercise was reported as a reason for discontinuation of exercise by a few informants. As reported in previous studies, increased knee pain and fatigue were reasons given for the participants' discontinuation of the exercise regimen (Lange et al., 2008; Liu & Latham, 2009). Lastly, the informants also expressed that they would like to learn light exercise. Prescribing a low to moderate intensity of exercise to older people with KOA is supported by the literature (Bosomworth, 2009; Liu & Latham, 2009).

The findings of the Phase I study also provide implications for the prescription of duration and frequency of the exercises. In the informants' usual exercise, they would usually take 30 to 45 minutes for movement of joints; this indicates a prescription of duration of exercise for a period of less than 30 minutes so that the therapeutic exercises for KOA can be integrated as a part of the clients' exercise habit. In addition, as the informants mentioned poor memory as a barrier to learning new exercises, less variation in the prescription of repetitions for different sets of exercise movements may be appropriate. Regarding frequency of exercise, the informants of the Phase I study perceived that good exercise should be persistently practised on every day and their exercise habit was also on a daily basis. In addition, some informants also exercised at home during the daytime or went for a stroll in the afternoon. Hence, older Chinese people with KOA may find it easiest to integrate exercise at a frequency of once or twice daily into their exercise habit.

Implications for the Arrangements of Exercise Programmes

The implications for the arrangements of exercise programmes for older Chinese people with KOA in Hong Kong obtained from the findings of the Phase I study included class arrangement, teaching venue, and teaching method. The informants had shown concerns about time clashes between exercise classes and other activities. Hence, some flexibility in the teaching time may enhance attendance and commitment to learning exercise. In addition, as the informants had shown concerns about the difficulties, time, and cost involved in travelling to the teaching venue, a nearby teaching venue is indicated for conducting exercise programmes for older Chinese people with KOA. Furthermore, the teaching method indicated from the findings of the Phase I study included live demonstration and group teaching. All the informants of the Phase I study indicated a preference for live demonstration and it was favoured over other methods such as video tapes or booklets. Live demonstration may be considered as a direct way of learning exercise and a clear demonstration of the exercise for the informants. In addition, live demonstration involves human interactions which may facilitate understanding of the exercise movements, so that the learner may learn better and be able to build up the necessary confidence for implementing the exercise movements in their daily living (Packer, Rogers, Coward, Newman, & Wakeley, 2001). The majority of informants favoured group teaching and expected that there would be some discussion among learners during the teaching time. This suggests that the development of exercise programmes for older Chinese people with KOA should include a group teaching format.

Summary of the Implications for Developing Exercise Programmes

In summary, the findings of the Phase I study have provided valuable insights and information for the development of exercise programmes for older Chinese people with KOA in Hong Kong. These include the reinforcement of contextual factors which favour the clients' positive perception and implementation of therapeutic exercise for KOA and the inclusion of an educational component for the knowledge and skills of therapeutic exercise for KOA. In addition, the content of the exercise programme should include a general introduction to the cause of KOA, the role of exercise for KOA, knowledge and skills of therapeutic exercises for KOA, group sharing sessions of self-practice of the learnt exercises in daily living, and supplementary information. Moreover, exercise prescription should consider exercises with empirical evidence supporting their effectiveness for KOA, exercises matching the exercise habit of older Chinese people with KOA, simple and safe exercises, exercises of low to moderate intensity, and exercises duration that can be incorporated in usual exercise practice of the clients and performed on a daily basis. Lastly, the arrangement of exercise programmes should consider a flexible class time, a nearby venue, and using live demonstration and group teaching in the delivery of the exercise programme. With reference to these implications, the next section of this chapter will report the development of an exercise programme for older Chinese people with KOA in Hong Kong.

THE DEVELOPMENT OF THE EXERCISE PROGRAMME AND ITS PILOT TESTING

Introduction

This section presents the development process and pilot testing of the exercise programme. The exercise programme was developed for nurses or other health care professionals to deliver exercise knowledge and skills to community-dwelling older Chinese people with KOA in Hong Kong, and the ultimate aim was to enhance continual practice of therapeutic exercises for KOA in this group of clients. As discussed in Chapter 2, previous exercise interventions for older people with KOA have not adequately considered the client's perceptions and experiences of exercise in the development of an exercise programme, and thus exercise adherence might be compromised. Therefore, the implications for development of an exercise programme from the perceptions and experiences of exercise in a group of older Chinese people with KOA in Hong Kong (i.e., the implications from the findings of the Phase I study that were reported earlier in this chapter) were used to guide the development of an exercise programme for older Chinese people with KOA in Hong Kong.

The development process consisted of several stages. First, the implications for development of an exercise programme from the findings of the Phase I study were identified. Second, in the light of these implications, exercise interventions in previous studies of people with KOA were revisited; the knowledge and therapeutic exercise appropriate for older Chinese people with KOA in Hong Kong were identified and used for drafting the exercise programme. Third, content and teaching materials for the exercise programme were developed; during this stage, multiple individual and group consultations were carried out with experts in order to validate the different aspects of knowledge, skills, and presentation methods for the exercise programme. At the end of the third stage, a draft exercise programme was produced according to the discussion results from the individual and group consultations. Fourth, an overall evaluation of the relevance and appropriateness of design, content, and presentation methods of the exercise programme was carried out by consulting a panel of experts in the related areas. Lastly, the exercise movements of the exercise programme were piloted with two older Chinese people with KOA in Hong Kong. The stages of the development process will be detailed in the following section. In addition, the finalized exercise programme to be evaluated in the Phase II study of this study will be presented.

Stage I: Identification of the Implications for Development of an Exercise Programme from the Findings of the Phase I Study

Implications for development of an exercise programme were identified from the findings of the Phase I study:

1. The favourable context for therapeutic exercise for KOA that had been revealed by the informants, including adoption of physical exercise as a method of self-management of KOA, the habit of exercising daily in the morning, and the positive perceptions and experiences of exercise, was to be reinforced in the exercise programme.
2. An educational component presenting the knowledge and skills of therapeutic exercise for KOA was to be included in the exercise programme. In addition, including the concepts in traditional Chinese Medicine regarding the cause of

KOA and the role of exercise in KOA in the content was to be considered in the exercise programme.

3. The content to be covered in the exercise programme included: (1) a general introduction to the causes of KOA, (2) the role of exercise in KOA, (3) knowledge and skills of therapeutic exercise for KOA, (4) group sharing of self-practice of the newly learnt exercise, and (5) supplementary information for self-revision of the newly learnt exercise.

4. With regard to exercise prescriptions in the exercise programme, exercises to be prescribed should have empirical evidence supporting their effectiveness on reducing symptoms of KOA. The type of exercise to be considered in the prescriptions included: (1) exercise that could be implemented at outdoor venues, (2) exercise that could be integrated as part of the whole body exercise, (3) exercise movements to be carried out on both sides of the body, (4) simple exercise, and (5) safe exercise with little risk of falling. A low to moderate intensity of exercise was to be considered in the prescriptions. The duration and frequency of exercise to be considered in the prescriptions included: (1) exercise duration that could be incorporated in usual exercise practice of the clients, (2) exercise that adopted counting as a measure of intensity, (3) exercise with less variations in number of repetitions for different sets of exercise movements, and (4) once or twice daily exercise.

5. Arrangements to be considered in the exercise programme included: (1) live demonstration, (2) group teaching, (3) time flexibility for attending the course sessions, and (4) a venue close to the clients' residence.

Stage II: Identification of Teaching Materials from the Literature

According to the implications identified, exercise interventions in previous studies of people with KOA were revisited. The structure and content as well as the exercise skills of previous studies were taken as references for re-establishing an exercise programme aimed at promoting continual practice of therapeutic exercises among older Chinese people with KOA in Hong Kong. Knowledge and skills found suitable for the clients regarding the following areas was identified from the literature (ACR, 2008; AF, 2008; Bandy & Sanders, 2001; Bennell et al., 2008; Bischoff & Roos, 2003; Brandt et al., 2008; Ellis & Li, 1993; Hooper & Moskowitz, 2007; McCaffrey & Fowler, 2003; O'Grady et al., 2000; Schnauzer, 2006; Stensdotter, Hodges, Mellor, Sundelin, & Hager-Ross, 2003; Zhong et al., 2006) to be included in the exercise programme:

- What is osteoarthritis of the knee? (i.e., the cause of KOA)
- What could be the benefits of exercise? (i.e. the role of exercise for KOA)
- Types and effects of therapeutic exercise for KOA.
- General guidelines about exercise for older people with KOA.

Regarding the selection of therapeutic exercises, previous studies on testing the effectiveness of exercise intervention for older people with KOA were reviewed and the exercises which demonstrated positive effects on the reduction of knee pain and physical disability were identified.

According to the literature (ACR, 2008; AF, 2008), flexibility, strengthening, and aerobic exercise should be recommended to older people with KOA. Therefore, flexibility, strengthening, and aerobic exercises which were in line with the implications obtained from the findings of the Phase I study were selected from the literature (ACR, 2008; AF, 2008; Baker et al., 2001; Deyle et al., 2000; Evcik & Sonel, 2002; Fransen et al., 2001; Hughes et al., 2004; Messier et al., 2000; Shakoor et al., 2008; Wong et al., 2005; Yip et al., 2007a).

In addition, the exercise prescription principles of overload (i.e., repeatedly overloading the physiologic function of a body tissue to a level beyond its threshold) and specificity (i.e., specifically stressed on the targeted physiologic capacities) (Ehrman et al., 2010; O'Grady et al., 2000) and the prioritization of exercise prescription on addressing the specific impairment (e.g., knee joint stiffness and quadriceps weaknesses) in people with KOA were used to guide the selection of exercises for the exercise programme.

From the literature, four flexibility (i.e., two knee range-of-motion exercises and two lower-limb stretching exercises) and three quadriceps strengthening exercises were identified for teaching the clients in the exercise programme.

The two knee range-of motion exercises require the exerciser to move the knee to its full range (Baker et al., 2001; Messier et al., 2000; Shakoor et al., 2008). The two lower-limb stretching exercises included an exercise stretched the back of the knee to increase the flexibility of the hamstring muscles and the other stretched the calf to increase the flexibility of the calf muscles (Fransen et al., 2001; Wong et al., 2005). These flexibility exercises were prescribed for nurturing and enhancing flexibility of the knees (O'Grady et al., 2000).

The three quadriceps muscle-strengthening exercises included: an isotonic exercise which uses an exercise band as the resistant to overload the quadriceps muscles (Evcik & Sonel, 2002; Fransen et al., 2001; Wong et al., 2005); a closed chain exercise which requires the exerciser to squat to about 30 degree from the vertical line to overload the quadriceps muscles (Baker et al., 2001; Deyle et al., 2000); and the other closed chain exercise which requires the exerciser to perform a sitting to standing movement to overload the quadriceps muscles in another way. These closed chain muscle-strengthening exercises were prescribed in corresponding to people's usual daily functional activities (Hughes et al., 2004). These muscle-strengthening exercises were prescribed for improving the strength and endurance of the quadriceps muscles, and the knee stability and function (Baker & McAlindon, 2000; Ehrman et al., 2010; O'Grady et al., 2000).

On the whole, the seven exercise movements were prescribed for reducing knee pain, stiffness and difficulties in physical functioning (Baker & McAlindon, 2000; Ehrman et al., 2010; O'Grady et al., 2000). The dosage (i.e., the number of repetitions and frequency of exercise) for each of the identified exercises initially referred to that described in the literature. Moreover, three types of aerobic exercise for improving overall physical fitness were identified from the literature for recommending to the clients.

Stage III: The Development of a Draft Exercise Programme

With reference to the structure of an exercise programme as described in the literature (Fransen et al., 2001; Hughes et al., 2004; O'Reilly et al., 1999; Wong et al., 2005) and the outlines of exercise programmes provided to older people in local community centres, a draft exercise programme was developed with multiple individual and group consultations with the pertinent experts throughout the development process. The main structure of the exercise programme included knowledge delivery, exercise demonstration and teaching, and a few group sharing sessions. The design of teaching materials, including the materials for delivery of knowledge in class and the take-home supplementary information, was also an important part in the development process of the exercise programme.

The knowledge content included four major areas: (1) the cause of KOA (from both western and traditional Chinese Medicine perspectives), (2) the role of exercise for KOA (from both western and traditional Chinese medicine perspectives), (3) types and effects of therapeutic exercise for KOA and (4) general guidelines about exercise for older people with KOA.

The draft knowledge content on the cause of KOA from the western medicine perspective was read by a medical officer who had been working in The Department of Orthopaedics and Traumatology in a public regional hospital in Hong Kong and was experienced in treating people with KOA. The draft content on the cause of KOA was confirmed to be clear and appropriate to older Chinese people with KOA by this medical officer; however, he suggested adding information on the signs and symptoms of KOA and the treatment options for KOA to increase the comprehensiveness of the knowledge provided. After adding the suggested content, the knowledge content on the cause of KOA, the signs and symptoms of KOA, and the treatment options for KOA was again submitted to the same medical officer for further validation of clarity and relevance.

The draft knowledge content on the cause of KOA and the role of exercise from the traditional Chinese Medicine perspective was read by a traditional Chinese Medicine practitioner who possessed a practice license from the local government and was practising as an independent Chinese Medicine practitioner in a private clinic. The draft knowledge content on the cause of KOA and the role of exercise from the traditional Chinese Medicine perspective was confirmed to be accurate and suitable for older Chinese people with KOA by the traditional Chinese Medicine practitioner.

The draft knowledge content on the role of exercise for KOA, types and effects of therapeutic exercise for KOA and general guidelines about exercise for older people with KOA was read by a registered physiotherapist. This registered physiotherapist was an experienced physiotherapist running a private physiotherapy clinic; she also worked on a voluntary basis with older people in the community centres of a non-government organization in Hong Kong. The draft knowledge content on the role of exercise for KOA, types and effects of therapeutic exercise for KOA and general guidelines about exercise for older people with KOA was confirmed to be accurate and appropriate by this registered physiotherapist. The draft prescriptions of therapeutic exercise for KOA were also discussed with this registered physiotherapist. Some modifications to the repetitions and frequency of exercise prescriptions were advised, and the discussion results were used to modify the exercise prescriptions in the exercise programme. Major modifications included reducing the variations in repetitions and frequency of the exercises and modifying the method of anchoring the exercise band in the isotonic muscle-strengthening exercise. It was hoped that these modifications might promote a better take-up of the exercises by older people with KOA. In addition, swimming was recommended as a form of aerobic exercise due to its popularity among some older Chinese people in Hong Kong.

In addition, every detail of the exercise demonstration and teaching was discussed with this registered physiotherapist. The researcher, who was a registered nurse and would be the instructor of the exercise programme, also rehearsed the teaching and demonstration of exercises in front of this registered physiotherapist to confirm the proper instructions and method of demonstration.

With regard to the design of the teaching materials, two social work staff who were working as centre supervisor and project coordinator, respectively, in a local community centre for older people, and a registered nurse who was working part-time in the community centre, were consulted for insights on preparing teaching materials for the exercise programme. They were also asked to give comments on a draft outline of the exercise programme and draft teaching materials, including two posters explaining the cause of KOA and the role of exercises, some presentation slides, and two pieces of supplementary information (a leaflet and a poster with pictures to demonstrate the exercises) for their appropriateness in presentation and level of knowledge and skills for older Chinese people in Hong Kong. Their comments were mainly positive and no modification was needed for the teaching materials.

Stage IV: Validation of the Exercise Programme

The draft exercise programme was validated by consultation with a panel of experts. The expert panel comprised seven people: one sports scientist, two registered physiotherapists, one medical officer, one traditional Chinese Medicine practitioner, one registered social worker, and one registered nurse. The sports scientist was an academic staff member in sports science, working in a local university. One of the registered physiotherapists was an independent practitioner in a private physiotherapy clinic and a volunteer worker with older people. The other registered physiotherapist was working in a non-government organization as a member of a multidisciplinary team serving frail elderly people living at home. The medical officer was working in The Department of Orthopaedics and Traumatology in a local public regional hospital and had almost 20 years of clinical experience in treating older people with KOA in Hong Kong. The traditional Chinese Medicine practitioner, who possessed a practice license from the local government, was an independent practitioner in a private medical consultation clinic. The registered social worker was the supervisor of a local community centre for older people. The registered nurse was working in a non-government organization as a case manager of a multidisciplinary team serving frail elderly people living at home and had more than 10 years of clinical experience in caring for older Chinese people in Hong Kong. The seven experts were invited to comment independently on the relevance and appropriateness of design, content, and presentation methods of the exercise programme; the comments were mainly positive and no modification was advised.

Stage V: Pilot Testing of the Exercise Movements

Seven exercise movements were selected to be taught in the exercise programme. Pilot testing of the seven exercise movements was carried out with two older Chinese people with KOA in Hong Kong prior to finalizing the exercise programme. The two older Chinese people with KOA were females, aged 82 and 74 years, living at home. Both of them were able to walk with a cane and perform self-care. They were taught individually for four weekly sessions at their home and asked to practise the exercise movements; this arrangement was similar to the design of the exercise programme. At the end of the last teaching session, which was a session for revision of the seven exercise movements, they were invited to give comments on the exercise movements. Neither of them had any problems with doing the exercise movements; they also showed motivation to continuously practise the exercise movements after the pilot test. Hence, no modification was needed for the exercise movements.

The Finalized Exercise Programme for Older Chinese People with KOA in Hong Kong

The exercise programme for older Chinese people with KOA in Hong Kong was finalized. The exercise programme was designed to be delivered to older Chinese people with KOA in groups (8-10 participants) at a community centre in four one-hour weekly sessions; group teaching was the preferred teaching method mentioned by the older Chinese people with KOA in the Phase I study and the group size of 8 to 10 participants per group was considered as effective for delivery client education (Ooi et al., 2007). To encourage full attendance, identical sessions would be offered at four different time slots within the same week. This was designed to address the concerns about time clashes with other activities that were raised by the older Chinese people with KOA in the Phase I study. All the teaching sessions would be delivered by an instructor and an assistant. The outline of the exercise programme is presented in Table 4.3.

The content of the exercise programme would include: (1) the cause of KOA, its signs and symptoms, and treatment options; (2) the role of exercise for KOA; (3) types and effects of therapeutic exercise for KOA including seven exercise skills; and (4) general guidelines about exercise for older people with KOA. The content would cover the skill teaching of two knee range-of-motion exercises, two stretching exercises, and three exercises to strengthen the quadriceps muscles, and also the recommendation of four types of aerobic exercise.

This content was designed according to the educational needs and implications identified from the data in the Phase I study. For example, the seven exercise movements included in the exercise programme were mainly performed in a sitting or standing position so that clients with KOA could perform these exercise movements either at indoor or outdoor venue. The seven exercise movements were mainly simple movements to be carried out on both legs; therefore, clients with KOA could learn these exercise movements and integrate them into their exercise habit as part of exercise for the whole body. The exercise movements to be performed in a standing position would use waist-height railings or fixed furniture as support so as to match the clients' principle of safety and exercise habit. In addition, the exercise movements adopted counting as a measure of exercise intensity to match the clients' exercise habit. Moreover, number of repetitions across the seven exercise movements was the same (i.e., 10 times) for easy memory. The whole set of seven exercise movements could be completed in 20 to 25 minutes at a low to moderate exercise intensity. The exercise movements were designed to be performed twice daily so that the clients could integrate these exercise movements into their exercise habit. Furthermore, the recommended aerobic exercises included walking, swimming, stepping and cycling. Walking and swimming were popular exercise among older people with KOA in Hong Kong. It would be easy for clients with KOA to find a step or stool for stepping exercise at indoor or outdoor venue and stationary cycling machine could be found in community centres for older people in Hong Kong.

Posters and visual projection of presentation slides would be used to assist delivery of the knowledge. These methods of knowledge delivery were commonly used in the local community centres for older people. In addition, pictures and photos in posters and presentation slides would assist the older people with KOA to take in the information, especially those older people with a low educational level.

Regarding the teaching of exercise movements, in addition to instructor demonstration and return demonstration by the participant, photos of an older Chinese female demonstrating the exercise movements at both indoor and outdoor local venues would be inserted in the presentation slides to illustrate the exercise movements; the aim was to enhance the participants' understanding of the exercise movements and their confidence in performing them within their home.

In addition, the content of the exercise programme would include group sharing and supplementary materials. Group sharing of self-practice of the newly learnt exercises would be held during each session except the first. Discussion among participants was suggested by the findings of the Phase I study and this might enhance social support for the exercises. A leaflet and a poster with pictures and simple written instructions for the exercise movements would be provided to the participants for self-revision of the exercise movements at home. The use of supplementary materials would help overcome difficulties in learning the exercises due to memory problems, and the use of pictures and simple instructions in the supplementary materials would be suitable for this group of clients who had a low educational level.

In each of the teaching sessions, the lecture time would be limited to 10 to 20 minutes, taking into account the normal attention span of older people (Arnold & Ryan, 2007). Teaching of the exercises would be provided in the sequence of theoretical inputs, instructor demonstration, and then return demonstration by the participants. This sequence was considered logical and instructor demonstration was the preferred teaching method suggested in the findings of the Phase I study.

Teaching of exercises in each session would be limited to only two or three exercise movements in view of the duration of each teaching session, the physical ability of the participants, and their ability to memorize the exercises. After the first session, revision of the exercise movements and group sharing of self-practice of the newly learnt exercises would be arranged at the beginning of each of the other three teaching sessions. This arrangement would allow the participants to review the exercises a few times and allow the instructor to correct the participants' incorrect movements. The sharing session would allow the participants to support each other and discuss how to implement the exercises at home.

In short, the design of teaching in a series of weekly sessions would allow the coach to teach step-by-step and correct any erroneous practice by the participants in return demonstrations of the exercises. It would also allow the participants to (1) practise and experience the exercises, (2) review the exercises a few times, (3) physically adapt the whole set of exercises for implementation, and (4) share and discuss how to implement the exercises at home. The supply of supplementary materials would promote take-up of the exercises by the participants. The participants thus would learn the exercises in a reasonable progression and develop confidence for continual practice of the exercises in their daily routine.

Detailed content of the exercise programme is presented in Table 4.4. Integration of the implications for the development of the exercise programme from the findings of the Phase I study is indicated in the last column of Tables 4.3 and 4.4. A sample of the presentation slides, the posters, and the leaflet used in the exercise programme are attached in Appendices 4.7 to 4.10. The teaching materials are developed in Chinese. The exercise programme was evaluated in Phase II of this study, which will be detailed in Chapter 5.

Table 4.3. The outline of the exercise programme		
Title:	Exercise Programme for Older Chinese People with Osteoarthritis of the Knee	
Purposes:	1. To provide the participant with necessary knowledge and skills for implementing therapeutic exercise for osteoarthritis of the knee.	* To include an educational component of knowledge and skills of therapeutic exercise for KOA
	2. To encourage the participant to implement and maintain the therapeutic exercise for osteoarthritis of the knee in daily living.	
Target clients:	Older Chinese people with symptomatic knee osteoarthritis who fulfilled the inclusion criteria.	
Mode of delivery:	Small groups (8-10 participants per class).	* To arrange group teaching
	A one-hour session per week for a total of four weeks.	
	A leaflet and a poster consisting of pictures of the therapeutic exercise will be provided for the practice at home.	* To provide supplementary information for self-revision of the newly learnt exercise
	An exercise diary will be provided for recording practice of the therapeutic exercise at home.	
Teaching methods:	Lecture, instructor demonstration, practice, return demonstration, and group sharing.	* To teach by live demonstration
Instructor:	Registered nurse	
Fee:	Free of charge	
Content:	Session One - What is osteoarthritis of the knee? - What could be the benefits of exercise? - General guidelines about exercise for older people with osteoarthritis of the knee. - Flexibility exercises and their effects on your knees. - Introducing and practising two knee range-of-motion exercises and one stretching exercise.	* To cover a general introduction to the cause of KOA, its signs and symptoms, and treatment options, the role of exercise in KOA, & knowledge & skills of therapeutic exercise for KOA * To reinforce the adoption of physical exercise as a method of self-management of KOA * To reinforce positive perceptions of exercise

Table 4.3. The outline of the exercise programme (cont'd)		
Content:	Session Two - A revision of the exercises learnt in session 1. - Group sharing of self-practice of the therapeutic exercises for osteoarthritis of the knee. - Introducing and practising one stretching exercise. - Muscle-strengthening exercises and their effects on your knees. - Introducing and practicing one muscle-strengthening exercise.	* To reinforce the adoption of physical exercise as a method of self-management of KOA * To reinforce positive perceptions and experience of exercise * To cover knowledge & skills of therapeutic exercise for KOA * To arrange group sharing of self-practice of the newly learnt exercise
	Session Three - A revision of the exercises learnt in sessions 1 and 2. - Group sharing of self-practice of the therapeutic exercises for osteoarthritis of the knee. - Introducing and practising two muscle-strengthening exercises. - Aerobic exercises and their effects on your body. - Examples of aerobic exercise for older people with osteoarthritis of the knee.	
	Session Four - A revision of all seven exercise movements learnt in the programme. - Group sharing of self-practice of the therapeutic exercises for osteoarthritis of the knee. - A revision of the importance of maintaining the therapeutic exercises for osteoarthritis of the knee.	
Class dates & time:	During 8 July – 1 August, 2008: Class A – Tue 10:30-11:30 am (8, 15, 22, & 29 Jul) Class B – Tue 2:00-3:00 pm (8, 15, 22, & 29 Jul) Class C – Fri 10:30-11:30 am (11, 18, 25 Jul & 1 Aug) Class D – Fri 2:00-3:00 pm (11, 18, 25 Jul & 1 Aug)	* To provide time flexibility for attending the course sessions
Venue:	Room 202, 2/F, Caritas elderly centre – Ngau Tau Kok, On Tak Road, Ngau Tau Kok, Kowloon.	* To arrange venue close to the clients' residence

* Implications for the development of the exercise programme from the findings of the Phase I study.

Table 4.4. Detailed content of the exercise programme

What is osteoarthritis of the knee? Osteoarthritis of the knee (KOA) is a common joint disease affecting older Chinese people. It is characterized by progressive damage to the joint cartilage (the slippery material at the end of long bones) due to the imbalance and abnormality in cartilage breakdown and synthesis. It causes changes in the structures around the joint and an increase of mechanical strain on the knee. These changes can include fluid accumulation, bony overgrowth, and loosening and weakness of muscles and tendons, all of which may limit movement and cause pain and swelling. (ACR, 2008; AF, 2008; Bennell et al., 2008; Brandt et al., 2008)	* To cover a general introduction to the causes of KOA * In addition, signs and symptoms of KOA and common treatment options are introduced
Signs and symptoms of KOA The knee is the most often affected weight-bearing joint in osteoarthritis. People with KOA often have limitations in their ability to rise from a chair, walk comfortably, and use stairs. Most of them experience joint pain during activity, which may be relieved by rest. It is also common for older people with KOA to experience overall stiffness in the knee in the morning or after prolonged inactivity. This stiffness typically lasts no more than half an hour. Those with later stage OA may suffer more severe pain and unstable joints, causing a sensation in the knees of 'giving way' or 'locking'. (ACR, 2008; AF, 2008; Hooper & Moskowitz, 2007)	
Traditional Chinese medicine perspective In traditional Chinese medicine, osteoarthritis is a condition of 'Bi syndrome' and it is due to the body being 'invaded' by the external climatological factors of 'wind', 'cold', and 'dampness'. For people with KOA, the stagnation of 'qi' and 'blood' in the knee causes the symptoms of pain and stiffness, respectively. (Ellis & Li, 1993; Zhong et al., 2006)	
Common treatment options for KOA Early stage: walking aids, modification of daily activities, weight reduction, hot/cold compress, medications, exercise, footwear and insoles, knee brace, transcutaneous electrical nerve stimulation, and acupuncture. Late stage: operation; e.g., joint replacement. (Moskowitz et al., 2007)	

Table 4.4. Detailed content of the exercise programme (cont'd)

What could be the benefits of exercise? Regular exercise in daily living helps maintain healthy muscles, bones, and joints. If your knees hurt, you may not feel like exercising. However, if you don't exercise, your knees can become even more stiff and painful. If you don't exercise, your muscles become smaller and weaker, and your knees become more unstable and prone to give way. The thigh muscles are particularly important in maintaining the stability of your knees, and a stable knee may feel less painful. Therefore, it is important to keep your thigh muscles as strong as possible. The stronger the muscles and tissues are around your knees, the better they will be able to support and protect your knees – even if your knees are weak and damaged from osteoarthritis. People with KOA have difficulties in moving their knees freely due to pain and stiffness. Exercise helps promote the circulation of 'qi' and 'blood' in your knees. It also keeps your knees as flexible as possible, allowing you to continue to do your daily tasks as independently as possible. People living with painful knees can easily feel depressed. Exercise can change your mood and make you feel better. (AF, 2008; McCaffrey & Fowler, 2003; Schnauzer, 2006)	* To cover a general introduction to the role of exercise in KOA * To reinforce the adoption of physical exercise as a method of self-management of KOA * To reinforce positive perceptions of exercise
General guidelines about exercise for older people with KOA 1. Wear comfortable clothes and shoes for doing exercise. 2. Before exercise, apply heat treatments to the area you will be exercising. Heat relaxes your knees and the muscles around them and helps relieve pain. Heat treatment should feel soothing and comfortable, not hot. Apply heat treatment for about 20 minutes. 3. Warm up. Firstly do gentle flexibility exercises for at least 10-15 minutes. 4. Proper body alignment during exercise is important. 5. Don't hurry. Exercise at a comfortable, steady pace that allows you to speak to someone without running out of breath. 6. Stop exercising if you start having sharp pain or more pain than usual. Pain is your warning signal that something is wrong. 7. Cool down. When you're going to finish your exercise, do your exercise at a slower pace and then repeat the flexibility exercises gently for 10-15 minutes. 8. Exercise is contraindicated during inflammatory periods because exercise can worsen the process. (ACR, 2008; AF, 2008)	* To cover a general introduction to the knowledge required for preparing for implementation of therapeutic exercise for KOA

Table 4.4. Detailed content of the exercise programme (cont'd)

Flexibility exercises and their effects on your knees Flexibility exercises are the movement and stretch of the muscles around the joint over a period of time that increases the range of motion around the joint. Range of motion is the normal amount your joints can be moved in certain directions. Flexibility exercises reduce the stiffness of your knees and help keep your knees flexible, so you can carry out your activities of daily living more easily. (ACR, 2008; AF, 2008; Bischoff & Roos, 2003; O'Grady et al., 2000)	* To cover a general introduction to the knowledge of therapeutic exercise for KOA (flexibility exercises)
Flexibility Exercises – Range-of-motion Exercises **1. Raise Leg** - In a sitting position, separate your legs slightly; your feet should be resting on the floor and pointing forward. - Straighten your back and keep your stomach in. - Extend your knee until your leg is as straight as possible. <u>Prescription:</u> 10 repetitions; twice a day for 7 days a week. (Baker et al., 2001; Messier et al., 2000; Shakoor et al., 2008) **2. Kick Back** - In a sitting position, separate your legs slightly; your feet should be resting on the floor and pointing forward. - Straighten your back and keep your stomach in. - Flex your knee by moving your foot backwards under the chair. <u>Prescription:</u> 10 repetitions; twice a day for 7 days a week. (Baker et al., 2001; Messier et al., 2000; Shakoor et al., 2008)	* To cover the skills of therapeutic exercise for KOA (flexibility exercises) * To prescribe simple, low intensity, safe, and effective exercise * To prescribe exercise that could be integrated in the exercise habit of this group of clients - could be implemented at outdoor venues - could be integrated as part of whole body exercise - exercise for both legs - adopted counting as measures - exercise on every day

Table 4.4. Detailed content of the exercise programme (cont'd)

Flexibility Exercises – Stretching Exercises 1. **Stretch the Back of Knee** - Sit up straight towards the edge of the chair; straighten one leg and bend the foot upward while the foot of the other leg is resting comfortably on the floor. Keep your stomach in, head upright, gaze forward, and chin tucked in. - Then bend your body forward with your hands on the thigh of the other leg until you feel a stretch at the back of your knee. - Hold for 10 seconds. Prescription: 10 repetitions; twice a day for 7 days a week. (Fransen et al., 2001; Wong et al., 2005) 2. **Stretch the Calf** - Stand about one to two feet away from a waist-height horizontal bar or stable furniture. - Place one leg forward and the other behind, keeping both feet flat and pointing forward. - Straighten your back and keep your stomach in, head upright, gaze forward, and chin tucked in. - Then slowly bend the front leg, keeping the back leg straight and the foot flat on the floor. - Bend the front leg until you feel a stretch in the lower calf area of the back leg. - Hold for 10 seconds. Prescription: 10 repetitions; twice a day for 7 days a week. (Fransen et al., 2001; Wong et al., 2005)	* To cover the skills of therapeutic exercise for KOA (stretching exercises) * To prescribe simple, low intensity, safe, and effective exercise * To prescribe exercise that could be integrated in the exercise habit of this group of clients - could be implemented at outdoor venues - could be integrated as part of whole body exercise - exercise for both legs - adopted counting as measures - exercise on every day
Muscle-strengthening exercises and their effects on your knees Muscle-strengthening exercises are training to strengthen your muscles. They are designated to work muscles a bit harder. Muscle-strengthening exercises help maintain or increase muscle strength. Strong muscles help keep your knees stable and more comfortable. Strong muscles, which also contribute to better function, help reduce the sensation in the knees of 'giving way' or 'locking' and the bone loss associated with inactivity. (ACR, 2008; AF, 2008; Bischoff & Roos, 2003; Stensdotter et al., 2003)	* To cover a general introduction to the knowledge of therapeutic exercise for KOA (muscle-strengthening exercises)

Table 4.4. Detailed content of the exercise programme (cont'd)	
Muscle-Strengthening Exercises **1. Raise Leg ± Resistance from an Exercise Band** - In a sitting position, separate your legs slightly; your feet should be resting on the floor and pointing forward. - Straighten your back and keep your stomach in. - Form a loop of the exercise band and place it around your lower legs below the calves to increase resistance of this exercise (optional). - Extend your knee until your leg is as straight as possible. - Hold for 5 seconds before you bring your foot back down to the floor. Prescription: 10 repetitions; twice a day for 7 days a week. (Evcik & Sonel, 20002; Fransen et al., 2001; Wong et al., 2005) **2. Squat to Half Way** - Stand with your feet about shoulder-width apart. Place your hands onto a waist-height horizontal bar or stable furniture. Bend your knees slightly, as if you were going to sit on a chair, to about 30 degrees. - Hold for 5 seconds before you straighten your knees. Prescription: 10 repetitions; twice a day for 7 days a week. (Baker et al., 2001; Deyle et al., 2000) **3. Rise up from Chair** - In a sitting position, place your feet about shoulder-width apart on the floor, pointing forward. - Keeping your back straight, hinge forward on your hips. Feeling the weight on your toes, slowly rise from the chair. - Keep your hips hinged while you gradually stand erect. - To sit, stand close to the chair and hinge as you bend your knees. Let your buttocks lead you to the front of the chair. Prescription: 10 repetitions; twice a day for 7 days a week. (Hughes et al., 2004)	* To cover the skills of therapeutic exercise for KOA (muscle-strengthening exercises) * To prescribe simple, low intensity, safe, and effective exercise * To prescribe exercise that could be integrated in the exercise habit of this group of clients - could be implemented at outdoor venues - could be integrated as part of whole body exercise - exercise for both legs - adopted counting as measures - exercise on every day

Table 4.4. Detailed content of the exercise programme (cont'd)

Aerobic exercises and their effects on your body Aerobic exercises include activities that use the large muscles of the body in a repetitive and rhythmic manner. The recommended duration of aerobic exercise is 15-30 minutes for people with KOA. Aerobic exercise improves heart, lung, and muscle function. Therefore, you can work longer without tiring as quickly. Aerobic exercises also help you sleep better, control your weight, and improve your overall sense of well-being. (ACR, 2008; AF, 2008; Bischoff & Roos, 2003)	* To cover a general introduction to the knowledge of therapeutic exercise for KOA (aerobic exercise)
Examples of aerobic exercise for older people with KOA (ACR, 2008; AF, 2008; Baker et al., 2001; Deyle et al., 2000; Messier et al., 2000; Yip et al., 2007a) 1. **Walking** 2. **Stepping** – up onto and down from one step/stair 3. **Cycling** 4. **Swimming**	* To cover a general introduction to the skills of therapeutic exercise for KOA (aerobic exercise)
Group Sharing Participants are encouraged to express their views and difficulties in practicing the newly learnt exercise in their daily living. Participants are also encouraged to exchange ideas and share their strategies for integrating the newly learnt exercise into their daily living, such as daily exercise habits or other routines in their everyday living. Instructor participates (1) to reinforce the importance of exercise in KOA, (2) to assure the participants' ability to implement the newly learnt exercises, and (3) to assist them in dealing with the hurdles in maintaining the newly learnt exercises in daily living.	* To arrange group sharing of self-practice of the newly learnt exercise

Note:

1. The seven exercise movements will require 20-25 minutes to complete.
2. All seven exercise movements are set to the same number of repetitions and frequency of exercise on every day.

* Implications for the development of the exercise programme from the findings of the Phase I study.

CHAPTER FIVE

THE PHASE II STUDY: PILOTING THE EXERCISE PROGRAMME

METHODS (PHASE II STUDY)

Introduction

As mentioned in Chapter 3, the overall aim of the study was to develop an exercise programme and pilot its acceptability to promote continual practice of therapeutic exercise among older Chinese people with knee osteoarthritis (KOA) in Hong Kong. The study was divided into two phases. The Phase I study aimed at exploring the perceptions and experiences of exercise from the perspective of the client group in order to develop an exercise programme. Based on the findings of the Phase I study and existing knowledge from the literature, an exercise programme was developed for the client group. The Phase II study aimed to pilot the acceptability of the newly-developed exercise programme and preliminary assess its effect on KOA in older Chinese people with KOA in Hong Kong.

In the Phase II study, a mixed-methods design was employed for piloting the acceptability of the exercise programme in terms of the participants' satisfaction with the exercise programme, their adherence to the recommended frequency in practising the exercise movements, their mastering of the exercise movements, and their perceptions and experiences of participating in the exercise programme. In addition, changes in the participants' health outcomes were assessed to preliminary identify the possible therapeutic effects of the exercise regimen. In this section, the details of the methods used in the Phase II study, including the study objectives, research design, sampling, intervention, data collection tools and procedures, ethical considerations, and data analysis, are described and discussed.

Aim and Objectives

The aim of the Phase II study was to pilot the acceptability of the newly-developed exercise programme in a group of older Chinese people with KOA in Hong Kong. Pilot testing a newly-developed intervention is essential. It helps improve the acceptability of the new intervention and develop it to reach its optimal effectiveness, and is deemed appropriate prior to testing the new intervention in large-scale studies (Polit & Beck, 2004). Lessons learnt from the pilot study can pave the way for improving the new intervention.

According to the intention underlying the development of the exercise programme that was to promote continual practice of therapeutic exercise in the client group, evaluations of the acceptability of the exercise programme was the focus of this pilot study. The acceptability of the exercise programme in this study referred to the participants' satisfaction with the exercise programme, their adherence to the recommended frequency in practising the exercise movements after completion of the exercise programme and mastering of the exercise movements, and also their perceptions and experiences of participating in the exercise programme. In addition, the therapeutic value of the exercise regimen was preliminary identified by assessing changes in the participants' health outcomes before and three months after the exercise programme. According to the literature, a three-month period is an adequate duration for demonstrating the therapeutic effects of exercise interventions in clients with KOA (Evcik & Sonel, 2002; O'Reilly et al., 1998; Roddy et al., 2005b). Both subjective and objective health outcomes were assessed and this can strengthen the validity of the conclusion with regard to the therapeutic value of an exercise intervention (Focht, 2006). Subjective health outcomes included the participants' self-reports on pain, stiffness, and physical functioning of the affected knee, and also the participants' self-reports on the status of their disease-specific and general health. Objective health outcomes mainly focused on physical functioning; they included measures of knee range-of-motion (knee ROM) and measures of muscle strength and endurance of the lower extremities.

Hence, the objectives of the Phase II study were:

1. To evaluate the participants' satisfaction with the exercise programme.
2. To examine the participants' adherence in practising the exercise movements according to the recommended frequency.
3. To assess the participants' mastering of the exercise movements.
4. To explore the participants' perceptions and experiences of participating in the exercise programme.
5. To assess changes in the participants' health outcomes before and at three months after the exercise programme in terms of :
    i. knee pain,
    ii. knee stiffness,
    iii. physical functioning of the knee,
    iv. disease-specific health status,
    v. general health status,
    vi. knee ROM, and
    vii. muscle strength and endurance of the lower extremities.

Study Design

The Phase II study employed a mixed-methods design (Creswell & Clark, 2007), which included both quantitative and qualitative components, with the quantitative component preceding the qualitative component. A mixed-methods design is particularly useful for studies with research questions requiring answers from both quantitative and qualitative data (Creswell & Clark, 2007). As recommended by Rallis & Rossman (2003), the use of a mixed-methods design for evaluating an intervention is advisable and pragmatic. It has the advantage of combining quantitative and qualitative information to make judgements about the merit and worth of an intervention (Creswell & Clark, 2007; Rallis & Rossman, 2003).

The quantitative component of this Phase II study adopted a descriptive approach to evaluate the participants' satisfaction with the exercise programme, their adherence to the recommended frequency in practising the exercise movements, and their mastering of the exercise movements. In addition, it also included a one-group pre-test and post-test quasi-experimental approach to assess changes in the participants' health outcomes before and at three months after the exercise programme. Regarding the qualitative component of this Phase II study, an exploratory approach was employed to explore the participants' perceptions and experiences of participating in the exercise programme.

Therefore, the quantitative component included collection of four sets of data: (1) the participants' satisfaction with the exercise programme, (2) the participants' adherence to the recommended frequency in practising the exercise movements, (3) the participants' mastering of the exercise movements, and (4) changes in the participants' health outcomes. The data on the participants' satisfaction with the exercise programme was collected immediately upon completion of the exercise programme. This has the advantage of minimizing the effects of the fading of memory, which is a threat to the internal validity of the data (Portney & Watkins, 2009). Data on the participants' adherence to the recommended frequency in practising the exercise movements and mastering of the exercise movements were collected three months after the exercise programme. There was no intervention given to the participants during the three-month period after the exercise programme. This was deliberately designed to identify the participants' ability to master the skill of practising the recommended exercises on their own and continuing the recommended exercises without the follow-up actions of healthcare providers.

The health outcome data before (pre-test) and at three months after (post-test) the newly-developed exercise programme (the intervention) were compared and the changes between the pre-test and post-test provided information on the possible therapeutic effects of the newly-developed exercise programme (Portney & Watkins, 2009). One of the major weaknesses of a one-group pre-test and post-test quasi-experimental design is the threat from history and maturation effects as there is no comparison group (Portney & Watkins, 2009); however, this may produce a stringent effect on the intervention in this Phase II study as the conditions of KOA of the participants were basically deteriorating and conflicting to the intervention effect. Hence, the newly-developed exercise programme was more likely to have been effective if the results indicated positive changes in health outcomes of the participants.

The qualitative component of the Phase II study focused on exploring the participants' perceptions and experiences of participating in the exercise programme. The data for this component were collected using individual semi-structured interviews which were conducted after collection of the quantitative data. The collection of data using individual semi-structured interviews was adopted in order to allow the researcher to better explore the participants' thoughts, experiences, and feelings with regard to the acceptability of the exercise programme. This ensures that the important topics are covered in the interview and allows the participants to express and elaborate freely on what is important to them regarding their perceptions and experiences of participating in the exercise programme (Gillham, 2000; Pilot & Beck, 2004).

Figure 5.1 shows the design of the Phase II study.

Figure 5.1. The Design of the Phase II Study.

Time ⟶

Quantitative Component				**Qualitative Component**
Before	**Intervention**	**After**		
Before	**Exercise programme**	Immediately after	Three months after	After the Post-test
▪ Health outcomes (Pre-test) Subjective reports on: – knee pain – knee stiffness – physical functioning of the knee – disease-specific health status – general health status Objective measurements of physical functioning included: – knee ROM – muscle strength & endurance of the lower extremities		▪ Satisfaction with the exercise programme	▪ Adherence to the recommended frequency in practising the exercise movements ▪ Mastering of the exercise movements ▪ Health outcomes (Post-test) Subjective reports on: – knee pain – knee stiffness – physical functioning of the knee – disease-specific health status – general health status Objective measurements of physical functioning included: – knee ROM – muscle strength & endurance of the lower extremities	▪ Individual semi-structured interviews to explore perceptions and experiences of participating in the exercise programme

Sample

Samples and Sampling

Chinese Hong Kong residents were recruited to the exercise programme according to the inclusion and exclusion criteria of the study. Individuals who (1) were aged 60 years or above; (2) fulfilled the American College of Rheumatology's clinical criteria for the classification of KOA (Altman, 1991); (3) had unilateral or bilateral KOA; (4) spoke Cantonese; and (5) were living at home were eligible for the study. The exclusion criteria included (1) participation in other exercise programmes provided by healthcare professionals on a regular basis; (2) treatment with intra-articular steroid or hyaluronate injection in the previous month; (3) concurrent acupuncture treatment; (4) the presence of hip osteoarthritis, rheumatoid arthritis, or other inflammatory joint disease; (5) a history of total knee replacement surgery on the osteoarthritic knee; (6) a history of surgical procedures on the lower extremity in the previous six months; and (7) the presence of comorbidity which contraindicated the exercise programme. These exclusion criteria were common in the client group and thus were addressed in the sampling criteria. Exclusion criteria 1 to 3 were co-existing interventions that would likely confound the outcomes of the study and cause difficulties in interpretation of the results (Portney & Watkins, 2009). Exclusion criterion 4 was other joint pain conditions that would confound the self-report of pain and physical functioning (Johnson, 2008). Exclusion criterion 5 was a condition with little osteoarthritic knee pain but with restriction of knee ROM on the operated knee (Moskowitz et al., 2007). Exclusion criterion 6 was a condition that might make it difficult for the individual to perform the movements in the exercise programme. The last exclusion criterion (7) indicated that the individual was not suitable for participating in an exercise programme.

Convenience sampling was used in the quantitative part of this Phase II study for recruitment of participants from a community centre for older people. This sampling method has the advantage of being more flexible when there are limitations in time and target sample (Polit & Beck, 2004). In this Phase II study, it was used for a number of reasons. First of all, the findings of the Phase I study indicated the importance of a nearby venue for provision of this kind of exercise programme, while a community centre for older people was the venue implied by the majority of informants in the Phase I study. A community centre for older people provides various activities and classes for the elders living in the district and also helps develop a network among them. Therefore, the elders living near the community centre would be more likely to have confidence in classes provided by the community centre and would be more likely to participate in the classes. In addition, the findings of the Phase I study also indicated the need for multiple classes to be offered at different time slots in the week for the exercise programme, so that participants could switch class attendance in case they were unable to attend the class at the original time slots. Therefore, only one community centre was used for recruitment of the sample in order to facilitate the design of multiple classes. Moreover, this Phase II study focused on collecting information for planning future studies rather than on generalizing the results of the exercise programme. Thus, the use of convenience sampling would not violate the main intention of the study. Furthermore, data on the number and background of older people with KOA were not available, rendering better sampling methods such as random sampling unfeasible.

Purposive sampling was used in the qualitative part of this Phase II study for recruitment of informants from the participants who had completed the quantitative part of the study. This sampling method allowed the researcher to select sample members who would be typical to provide information on the perceptions and experiences of participating in the exercise programme (Polit & Beck, 2004). Participants with different personal or clinical backgrounds and different responses towards the exercise programme were purposively selected in order to enrich the understanding of the participants' views, experiences, and feelings towards participating in the exercise programme (Patton, 2002).

Sample Size

The sample size for the quantitative part of this Phase II study was determined to be 30 according to the recommendations on sample size for pilot studies in the field of medicine and clinical practice (Browne, 1995; Lancaster, Dodd, & Williamson, 2004). With reference to previous studies of exercise programmes in older people with KOA in Hong Kong (Tsang, 2003; Yip et al., 2007a), an attrition rate of 10% was built into the estimation of sample size. Thus, a sample of 34 participants was targeted in the quantitative part of this Phase II study.

For the qualitative part, the diversity in background of the sample in the quantitative part of this Phase II study and the variations in the participants' responses towards the exercise programme were used as indicators for determination of the sample size (Morse & Field, 1995; Patton, 2002; Polit & Beck, 2004). A sample of 20% of participants in the quantitative part of the study was considered an adequate sample to reveal the participants' perceptions and experiences of participating in the exercise programme; hence a sample of six informants was planned for the qualitative part of this Phase II study.

Sampling Process

The researcher contacted a community centre for older people in a district with the highest number of older people in Hong Kong (C&SD of the HKSAR, 2008), and introduced the study. It was a centre for older people with about 350 members. With permission from the head of the centre, the exercise programme was publicized by displaying a poster outlining the exercise programme and by making verbal announcements about the exercise programme in the centre. Older people who wanted to join the exercise programme were individually assessed by the researcher based on the inclusion and exclusion criteria for the quantitative part of this Phase II study. Only those older people who fulfilled the sampling criteria were recruited into the quantitative part of this Phase II study. It took approximately four months in total for the completion of the quantitative part of this Phase II study, which comprised four weeks for the delivery of the exercise programme and twelve weeks for the participants' recording of their practice of the recommended exercises at home. Thereafter, participants in the quantitative part of this Phase II study with different backgrounds (e.g., gender and educational levels) and different responses to the exercise programme (e.g., different levels of satisfaction with the exercise programme and different levels of adherence to the recommended exercises) were identified and purposively sampled by the researcher for the qualitative part of this Phase II study.

Intervention– the Exercise Programme

The intervention was an exercise programme developed from the findings of the Phase I study, which was a qualitative study of older people with KOA in Hong Kong, and the existing knowledge from the literature. (Refer to page 176 to 179 and also Tables 4.3 and 4.4 for details of the exercise programme.) The development of the exercise programme was reported in Chapter 4 of this thesis.

In this study, four classes of the exercise programme were started and arranged at four different time slots in the same week at the community centre. They were run on Tuesday morning, Tuesday afternoon, Friday morning and Friday afternoon. Hence, the same teaching session was repeatedly run at the four time slots within each week. With this arrangement, the participants could switch their class attendance if they had difficulties in attending one or two of the sessions at their original class time. This flexibility promoted the participants' full attendance at the four teaching sessions of the exercise programme.

The teaching venue was a community centre. A multi-functional room of about 40 square metres in the community centre was arranged with chairs and adequate space for the participants to fully extend their legs. In addition, a waist-height cabinet fixed along a wall was available at the teaching venue so that participants could hold onto it for support while performing exercise movements in a standing position.

All the teaching sessions were provided by the researcher, who is a registered nurse and an academic staff in nursing, and whose competence in teaching the recommended exercise had been assessed and confirmed by an experienced registered physiotherapist. A research assistant, a registered nurse with seven years of experience in community nursing with older people, was employed and trained to assist the delivery of the teaching sessions. She assisted in teaching the participants the exercise skills during return demonstrations and also the recording of exercise practice in the exercise diary of this study.

The content of the exercise programme was delivered as planned (Refer to page 176 to 187 in Chapter 4 for details). The leaflet for this exercise programme was provided to the participants at the third session so that they could review the exercises using the leaflet as a reference. At the last session, the poster with mainly pictures of the recommended exercises was provided to the participants for easy revision at home. It was rolled up and decorated with a red ribbon, resembling a graduation certificate, to provide a sense of achievement for the participants so as to encourage their continual practice of the recommended exercises.

Data Collection Tools

The data to be collected in this Phase II study included the participants' satisfaction with the exercise programme, adherence to the recommended frequency in practising the exercise movements, mastering of the exercise movements, perceptions and experiences of participating in the exercise programme, subjective reports on health outcomes, and objective measurements of physical functioning. A Satisfaction Questionnaire was developed for assessing the participants' satisfaction with the exercise programme. An Exercise Diary was developed for assessing the participants' adherence to the recommended frequency in practising the exercise movements. A Return Demonstration Performance Record Sheet was developed for assessing the participants' mastering of the exercise movements. An Interview Guide was developed for collecting data on the participants' perceptions and experiences of participating in the exercise programme. Tools for collecting data on subjective reports of health outcomes included the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for subjective reports on knee pain, knee stiffness, physical functioning of the knee, and disease-specific health status, and the 12-item

Short Form of the Medical Outcome Study Questionnaire (SF-12) for subjective reports on general health status. Objective measurements of physical functioning included using a goniometer for measuring knee ROM, and implementing the Timed-Stands Test (TST) for measuring muscle strength and endurance of the lower extremities. In addition, a Socio-Demographic and Clinical Data Sheet was developed for collecting the participants' socio-demographic and clinical data. Table 5.1 provides an overview of the data collection tools in this Phase II study.

Table 5.1. An overview of the data collection tools in the Phase II Study.

Data Collection Tools	Data to be collected
Satisfaction Questionnaire	Satisfaction with the exercise programme
Exercise Diary	Adherence to the recommended frequency in practising the exercise movements
Return Demonstration Performance Record Sheet	Mastering of the exercise movements
Interview Guide	Perceptions and experiences of participating in the exercise programme
WOMAC	
– WOMAC pain subscale	Subjective report on knee pain
– WOMAC stiffness subscale	Subjective report on knee stiffness
– WOMAC physical functioning subscale	Subjective report on physical functioning of the knee
– WOMAC total	Subjective report on disease-specific health status
SF-12	Subjective report on general health status
Goniometer	Objective measurements of physical functioning in terms of knee ROM
Timed-Stands Test (TST)	Objective measurements of physical functioning in terms of muscle strength and endurance of the lower extremities
Socio-Demographic and Clinical Data Sheet	Socio-demographic and clinical data

Note:

WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index (Visual Analogue Scale); SF-12 = Short Form of the Medical Outcome Study questionnaire (12 items).

Satisfaction Questionnaire

A satisfaction questionnaire (Appendix 5.1) was developed by the researcher to assess the participants' satisfaction with the exercise programme. The satisfaction questionnaire included evaluations of the participants' satisfaction with the purposes, content, coaching, and arrangements of the exercise programme. In addition, the participants' confidence in learning, memorizing, and continual practising the exercise movements was also evaluated. It consists of 10 items and the participants were asked to respond on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The responses are assigned a numerical value, from '0' for 'strongly disagree' to '4' for 'strongly agree'. A total score ranging from 0 to 40 can be obtained by summing up all the item scores, and then transformed into a 0–100 score for easy interpretation. The transformation is carried out by multiplying the original score by 2.5. Therefore, the possible range of the total score is 0 to 100. A high score indicates a high level of satisfaction with the exercise programme. In addition to the 10 items, a few lines were drawn at the bottom of the page to invite open-ended comments. Face validity of the questionnaire, including comprehensiveness and readability, were established by consultation with an expert panel that comprised two researchers experienced in developing satisfaction questionnaires, a community nurse, a community social worker, and two older people with previous experience of a community centre based exercise programme. The content and number of items were supported by panel members, but a few item wordings were changed to enhance clarity of the questionnaire in the validation process.

Exercise Diary

An exercise diary (see Appendix 5.2 for a sample front page and an insert page) was developed to assess the participants' adherence to the recommended frequency in practising the exercise movements of the exercise programme. The diary is a booklet with photos of the recommended exercise movements arranged in the first column of a table. The photos are exactly the same as those used to teach the exercise movements in the exercise programme. The remaining seven columns are designed to resemble a calendar, with the second column being Monday and the last column being Sunday. In the row of days, the background is designed with alternating colours of pink and yellow to remind the participants to practise the exercise in the morning and evening, respectively. Each photo of a recommended exercise movement on the left corresponds to a row of pink and a row of yellow boxes. Above the row of days, there is a row of pictures with numbers indicating the various reasons for being unable to perform the recommended exercise.

The participants were asked to record in the diary the frequency of performing the recommended exercise and the reason for not performing the exercise. They were asked to stamp the pink and yellow boxes of the exercise movements which had been practised. If the participant had not practised the exercise, he / she needed to write down a number from the choice of reasons given in the exercise diary. The participants were taught the recording skills at each session of the exercise programme. They were then asked to make their own record at home for a period of 12 consecutive weeks, starting from the week that they had completed the exercise programme.

To conclude the data on the participants' adherence, an average percentage was calculated from the record of the exercise diary. This was carried out by dividing the actual frequency by the expected frequency of practice. A high percentage therefore indicates a high level of adherence to the recommended exercises. In addition, percentages for each of the recommended exercise movements were also calculated from the record using the same approach (i.e., by dividing the actual frequency by the expected frequency of practice of the respective exercise movement). The reasons for not practising the movement were also summarized.

The exercise diary was developed by the researcher in consultation with a community social worker, a community nurse, and a project coordinator working at a community centre for older people in Hong Kong.

Return Demonstration Performance Record Sheet

A return demonstration performance record sheet (Appendix 5.3) was developed by the researcher to assess the participants' mastering of the exercise movements of the exercise programme. There are seven items, each recording the performance of one of the seven exercise movements. Each item is constructed as a 6-point Likert scale with the rating ranging from 0 to 5. A better performance yields a higher rating. The rating is based on five criteria developed by the researcher: (1) correct posture, (2) correct movement of the body part, (3) correct contraction of the muscle group, (4) correct holding of the muscle contraction, and (5) smooth coordination of the movement. Each criterion is weighted with 1 point. A total score, calculated by summating all the item scores, is used for interpreting the overall level of mastering of the exercise movements by the participant. The possible range of the total score is originally 0 to 35, and then transformed into a 0–100 score for easy interpretation. The transformation is carried out by multiplying the original score by 2.85714. A high score indicates a high level of mastering of the exercise movements.

Interview Guide

An interview guide (Appendix 5.4) was developed by the researcher to explore the participants' perceptions and experiences of participating in the exercise programme. It was used for carrying out audio-recorded semi-structured interviews in the qualitative part of this Phase II study. The face validity of the interview guide for this Phase II study was attained by inviting three researchers with extensive experience in qualitative studies to comment and give suggestions, and to agree on the final version of the interview guide. Areas of focus in the interview guide included the participants' views regarding the exercise programme, their experience of participating in the exercise programme, and their experience of integrating the recommended exercise into daily routine.

Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) VA 3.1 – Hong Kong Version

The WOMAC (Appendix 5.5) was used to assess the health outcomes of the exercise programme in terms of participant-reported pain, stiffness, and physical functioning of the affected knee, and also in terms of participant-reported disease-specific health status. The WOMAC was developed by Bellamy in 1982 (Bellamy, 1982), and has undergone several revisions and modifications. It is a tri-dimensional disease-specific self-reported health status questionnaire probing pain, stiffness, and physical functioning with reference to the affected joint in the previous 48 hours in patients with osteoarthritis of either the hip or knee (Bellamy, Buchanan, Goldsmith, Campbell, & Stitt, 1988a, 1988b).

The WOMAC consists of 24 items (5 in pain, 2 in stiffness, 17 in physical functioning) yielding reports on the severity of symptoms of the affected joint, which can be completed in ten minutes (Bellamy, 2007; Martin, Engelberg, Agel, & Swiontkowski, 1997). It is available as a Likert or Visual Analogue Scale (VAS), but the VAS was found to be slightly more sensitive (Bellamy et al., 1988a, 1988b). Therefore, the VAS was adopted in this Phase II study. The response for each item is rated on a 100 mm horizontal VAS extending from 0 mm (indicating no such symptom) to 100 mm (indicating extreme experience of the symptom). For example, the left end (0 mm) denotes 'no pain at all' for pain, 'no stiffness at all' for stiffness, and 'no difficulty at all' for physical functioning, while the right end (100 mm) denotes 'extremely painful', 'extremely severe join stiffness', and 'extreme difficulty in physical functioning' for the three respective components. Hence, the WOMAC items and components are scored in a way that a lower score represents a better health state of the measured item or, as a whole, the measured component.

According to Bellamy (2007), item scores of the same component can be aggregated to obtain a subscale score. The possible range of the subscale score is 0 to 500 mm for pain, 0 to 200 mm for stiffness, and 0 to 1700 mm for physical functioning. The subscale scores can then be transformed by a normalization procedure to produce a normalized subscale score, which ranges from 0 to 100 (Bellamy, 2007). After the normalization procedure, the three components (i.e., pain, stiffness, and physical functioning) are equally weighted (i.e., ratio 1:1:1).

In addition, a total score with consideration of the relative importance of the three components can be obtained after normalization of the subscale scores. According to Bellamy, Wells, & Campbell (1991), the relative values of importance for pain, stiffness, and physical functioning are 42%, 21%, and 37%, respectively. Therefore, a total score with a possible range from 0 to 100 can be obtained by summating the weighted subscale scores, which are obtained by multiplying the normalized subscale scores by the relative importance of the components.

Therefore, the health outcomes of subjective reports on knee pain, knee stiffness, and physical functioning of the knee were measured by the WOMAC pain, stiffness, and physical functioning subscale scores, respectively, while the subjective reports on disease-specific health status were measured by the WOMAC total score.

The validity, reliability, and responsiveness of the WOMAC have been well established in two major validation studies (Bellamy et al., 1988a, 1988b), with more than 30 studies examining its basic clinimetric properties (Bellamy, 2007). The construct validity of the WOMAC was validated by factor analysis and also against a number of validated instruments, global assessments, and physical examinations (Bellamy et al., 1988a, 1988b). In addition, the responsiveness of the index was supported by the results of a study which demonstrated statistically significant improvements in the health status of osteoarthritis patients in all three subscales (Bellamy et al., 1988a, 1988b). The internal consistency was reported by Cronbach's alpha at 0.88−0.93 for the pain subscale, 0.73−0.93 for the stiffness subscale, and 0.88−0.94 for the physical functioning subscale, which were well above acceptable levels (Bellamy et al., 1988a). Test-retest reliability using a one-week retest interval was 0.64 for pain, 0.61 for stiffness, and 0.72 for physical functioning (Bellamy et al., 1988a). The WOMAC has been translated into more than 70 languages, and its validity and cross-cultural adaptability for Asians have been confirmed in various studies (Bae et al., 2000; Bae et al., 2001; Thumboo, Chew, & Soh, 2001; Xie, Li, & Thumboo, 2005; Xie et al., 2006). The validity and reliability of the WOMAC − Hong Kong version have been supported by a number of previous studies of older people with KOA in Hong Kong (Tsang, 2003; Wong et al., 2005).

Short Form of the Medical Outcome Study Questionnaire – 12-item (SF-12) Standard Version 2 - Chinese (Hong Kong) Version

The SF-12 (Appendix 5.6) was used to assess the health outcomes of the exercise programme in terms of participant-reported general health status. The SF-12 was developed by Ware, Kosinski, & Keller in 1996. It is a generic self-reported health status questionnaire, consisting of 12 questions measuring eight dimensions, namely physical functioning (two items), role limitations due to physical health problems (two items), bodily pain (one item), social functioning (one item), general mental health (two items), role limitations due to emotional problems (two items), vitality, energy, or fatigue (one item), and general health perceptions (one item) (Ware, Kosinski, Turner-Bowker, & Gandeck, 2007). In addition, factor analysis demonstrates that there are two principal factors, namely physical and mental components, underlying the eight dimensions (Ware, Kosinski, & Keller, 1995). The physical component is called the Physical Health Summary Scale (PCS), and the mental component is called the Mental Health Summary Scale (MCS). The participants were asked to report their general health status by recalling their personal experience in the previous four weeks and responding to the 12 items. The response for each item is rated on a 3-point or 5-point Likert scale. It takes only two to three minutes to complete the 12 items (QualityMetric, 2010).

All 12 items in the SF-12 were selected from the SF-36 Health Survey (Ware, Kosinski, & Keller; 1995, 1996). The SF-36 was developed by Ware, Snow, Kosinski, & Gandek in 1993. It is one of the most widely-used health survey instruments throughout the world; its psychometric properties have been well validated, and its usefulness in measuring health status and monitoring health outcomes in both general and specific populations is also proven (Lam, Gandek, Ren, & Chan, 1998; Ware, 1998; Ware et al., 2007). The SF-12 was developed to be a shorter, valid alternative to the SF-36 and has been shown to have excellent psychometric properties, as reported in previous studies (Gandek, Ware, & Aaronson, 1998; Hurst, Ruta, & Kind, 1998; Jenkinson, Layte, & Jekinson, 1997; Resnick & Nahm, 2001; Resnick & Parker, 2001). The Chinese (Hong Kong) version of the SF-12 has also been tested in the Chinese population in Hong Kong, and the results supported it as a valid and reliable instrument for Hong Kong people (Lam, Tse, & Gandek, 2005). In addition, the Chinese (Hong Kong)-specific SF-12 PCS and MCS explain 88% and 90% of the total variances of the Chinese (Hong Kong)-specific SF-36 PCS and MCS, respectively (Lam et al., 2005). The SF-36 was well validated in the Hong Kong Chinese population in a study in 1998 (Lam et al., 1998). Nevertheless, in the development and validation processes, further improvements to the original SF-12 have been made, including better item wording and an increased range of response choices for some of the items; thus, the SF-12 currently used is the second version (Ware et al., 2007). In summary, the SF-12 is a practical, reliable, and valid measure of physical and mental health (QualityMetric, 2010).

For scoring, the responses to each item are recoded; items of the same scale are summated and then transformed into scale scores of 0 to 100 using the formula provided in the manual (Ware et al., 2007). In addition, transformed scale scores are aggregated using weights (factor score coefficients) to produce two aggregate norm-based summary scores (i.e., PCS and MCS scores) by using the formula provided by Lam, Lauder, Lam, & Gandek in 1999. The PCS and MCS scores, respectively, indicate the physical and mental aspects of the general health status of the respondent, with a high score indicating better functioning of the measured aspect of health status. The norm-based score is a comparison with the population norm of the Hong Kong Chinese; a score below 50 indicates a below-average health status, and vice versa (Lam et al., 2005). The possible range of the norm-based scores can be extended from negative to positive values according to the coefficients used in the formula (Lam et al., 1999).

Knee Range of Motion (Knee ROM)

The participant's knee ROM was assessed in this study to evaluate the health outcomes of the exercise programme in terms of physical functioning. Knee ROM is an objective indicator of knee joint functioning (Bellamy & Buchanan, 2001). It is obtained by measuring the arc from the maximal extension of the knee to the maximal flexion of the knee (Berman, Snyder, Kozier, & Erb, 2008). The normal knee ROM is 120 to 130 degrees in adults (Berman et al., 2008). A knee ROM of less than 120 degrees indicates subnormal knee joint functioning. A goniometer with the scale measuring to the nearest one tenth of a degree was used for this measurement in the Phase II study.

Timed-Stands Test (TST)

The TST was also used in this study to evaluate the health outcomes of the exercise programme in the area of physical functioning. The TST is an objective measure of muscle strength and endurance of the lower extremities (Bellamy & Buchanan, 2001). This test requires the individual to sit on a stable chair which should allow the individual to rest the feet completely on the ground and to keep the knees bent to slightly less than 90 degrees. The individual then crosses his arms over his chest, stands up and sits down on the chair 10 times, using only the lower extremities.

The total time taken to perform this task is recorded in seconds. The ability to perform this task correlates with age and is reduced by osteoarthritis; thus, the TST is a valid measurement of the physical functioning of clients with KOA (Bellamy & Buchanan, 2001). According to MacFarlane, Chou, Cheng, & Chi (2006), older Hong Kong Chinese people could complete the task in less than 30 seconds. A shorter time indicates greater muscle strength and endurance of the lower extremities.

Socio-Demographic and Clinical Data Sheet

A socio-demographic and clinical data sheet (Appendix 5.7) was developed by the researcher to record the participants' characteristics, including age, gender, education, marital status, type of residence, living arrangements, employment status, social assistance, exercise habits, medical follow-up for KOA, duration of symptoms, bilaterality of symptoms, use of walking aids, body weight, body height, and chronic comorbidities.

Data Collection Procedures

Data Collection Procedures in the Quantitative Component

Participants in the exercise programme were given an explanation of the study's purpose and their involvement and rights of participation in the study by the researcher before data collection. Participants were asked not to join other exercise programmes during the study period. The participants who agreed to participate in the study were provided with an information sheet about the study and asked to sign a consent form (Appendices 5.8 and 5.9) to indicate their agreement to participating in the study. The researcher then made an appointment with the participant for the collection of baseline data, including the WOMAC, the SF-12, knee ROM, and the

TST, and also the socio-demographic and clinical data, in a room provided by the community centre. The participants then started the exercise programme within 10 days of the collection of the baseline data.

Towards the end of the first teaching session, the participants were provided with an exercise diary and a self-inked stamp for recording their practice of the recommended exercises at home. They were taught in detail how to make use of the exercise diary and how to use the stamp for recording their exercise practice. Thereafter, the participants' exercise diaries were checked at each teaching session and feedback was provided as appropriate. At the last teaching session, the participants were provided with insertion pages for the exercise diary that covered four weeks. They were asked to return the exercise diary to a centre worker after they completed the four-week record. The centre worker would then provide them with another four weeks of insertion pages. The participants could ask for another stamp from the centre worker if their existing one had run out of ink. They were then asked to attend a post-test session when they had completed a total of 12 weeks of the exercise diary record.

At the end of the last teaching session, the participants were asked to complete the satisfaction questionnaire with assistance from the research assistants and the community centre's workers. The instructor (i.e., the researcher) left the room before the collection of data on the satisfaction questionnaire to minimize social desirable bias in the data.

Three months after the exercise programme, the participants attended a post-test session for the collection of post-test data, including the WOMAC, the SF-12, knee ROM, and the TST, in a room provided by the community centre. The post-test data were assessed by a research assistant who had been trained to collect data but was blinded to the pre-test data.

In addition, the participants were asked to perform a return demonstration of the seven recommended exercise movements at the post-test session. The research assistant was also trained to assess the performance of the exercise movements.

Data Collection Procedures in the Qualitative Component

After the post-test sessions, the researcher sampled a total of six participants from those of the exercise programme for an individual semi-structured interview. The researcher contacted the selected participants by telephone to explain the purpose of the qualitative part of the Phase II study, their involvement, and their rights of voluntary participation. With the verbal consent of the participants, the researcher made an appointment with them for an interview at the community centre and told them who would be conducting the interview. All the interviews were carried out by a research assistant who was very experienced in conducting qualitative interviews. Arrangements were made for the research assistant to meet the participants at one of the teaching sessions. The researcher briefed the research assistant on the exercise programme and on the purpose, design and data collection of the study before she carried out the interviews. During the interviews, the research assistant explained the study, provided the participants with an information sheet on the study, and obtained written informed consent from each participant before proceeding to the main interview process. (See Appendices 5.10 and 5.11 for the consent form.) All interviews were conducted within two weeks after the post-test session, in a quiet room in the community centre, and audio-recorded. Each interview lasted from 40 to 60 minutes.

Ethical Considerations

Ethical approval for the Phase II study was obtained from The Survey and Behavioural Research Ethics Committee of The Faculty of Medicine, The Chinese University of Hong Kong (Appendix 5.12). Approval for conducting the study was also obtained from the community centres concerned (Appendix 5.13). Permission to use the instruments (the WOMAC and the SF-12) used in this Phase II study was obtained from the authorized person or company before commencement of the study.

All the participants, of both the quantitative and qualitative parts of this Phase II study, participated on a voluntary basis. They were given a detailed explanation of the purpose of the study and their involvement in the study, issues concerning confidentiality and anonymity, and their right to withdraw from the study. Their rights of voluntary participation were emphasized to them, and they were informed that their withdrawal from the study at any time would not affect the services they subsequently received. Two sets of information sheets and consent forms were developed for the quantitative and qualitative parts of the Phase II study, respectively. Information sheets (Appendices 5.8 to 5.11) containing the contact details of the researcher were given to the participants according to the part of the study they participated in. Written consent (Appendices 5.8 to 5.11) was obtained from each of the participants before data collection according to the part of the study they were involved in. Privacy was enhanced by conducting data collection or interview at a quiet place in the community centre.

All the data were kept confidential and put in a safe place where only the researcher could have access to them. A coding system was used in the study for identification of the participants' data: each of the participants was assigned a code number, while the names of the participants were stored separately from the participants' data. All the data were used solely for the purpose of the study.

Data Analysis

Analysis of Data from the Quantitative Component

Data management on some of the raw data was carried out prior to data entry and data analysis. Data from the socio-demographic and clinical data sheet, the SF-12, the satisfaction questionnaire, and the return demonstration performance record sheet were coded; data from the WOMAC were measured to the nearest millimetre, using a ruler; and data from the exercise diary were counted. Data coding, measuring, and counting were checked to ensure accuracy.

Subsequently, the data were entered into the Statistical Package for the Social Sciences (SPSS) software (version 16.0) for Windows except for the open-ended comments from the satisfaction questionnaire, which were summarized and reported. After data entry, data cleansing (Portney & Watkins, 2009) was carried out to enhance the validity of the data analysis. The data file was printed out and checked against the original data to ensure that the entries were correct. After that, frequency counts were run for all categorical variables to ensure that no data were missing. Descriptive statistics, including means, minimums, and maximums, were run for continuous variables to ensure that all the ranges of scores were appropriate.

Some of the data were then transformed using the SPSS into a form suitable for data analysis: (1) The satisfaction item scores and return demonstration performance item scores were summated and transformed into 0–100 satisfaction and return demonstration performance total scores, respectively. (2) Regarding adherence to the recommended frequency in practising the exercise movements, the actual frequencies were divided by the expected frequencies to obtain average percentages of practice and also percentages of practising individual exercise movements. (3) The WOMAC item scores were aggregated and normalized to 0−100 normalized scale scores. After that, the three normalized scale scores were multiplied by the respective relative importance values and summated to obtain the WOMAC total scores. (4) The SF-12 item scores were aggregated as needed to obtain raw scale scores. The raw scale scores were transformed into 0−100 scale scores, and the transformed scale scores were computed using the specific formulas to obtain norm-based summarizing scores. (5) Knee ROMs were calculated by subtracting the maximal degree of flexion from the maximal degree of extension of the knee.

Data analysis included the use of descriptive and non-parametric statistics to describe the sample characteristics and address the study objectives. Tests of normality for the health outcomes were carried out by using the Kolmogorov-Smirnov one-sample test to guide selection between parametric and non-parametric statistical tests (Pallant, 2001). Almost half of the test results showed that the health outcome variables were not normally distributed. Therefore, non-parametric statistics were used for data analysis of health outcomes in the Phase II study (Pallant, 2001; Portney & Watkins, 2009). The level of significance (alpha) set for this study was 0.05.

To describe the sample characteristics, descriptive statistics (i.e., means, standard deviations, ranges, frequencies, percentages, modes and quartiles) were used for summarizing socio-demographic and clinical data, and the baseline findings of the health outcome measurements (i.e., the WOMAC, knee ROM, the TST, and the SF-12).

To evaluate the participants' satisfaction with the exercise programme, descriptive statistics were used for summarizing the satisfaction item and total scores.

To examine the participants' adherence in practising the exercise movements according to the recommended frequency, descriptive statistics were used for describing the overall adherence, the adherence towards each of the exercise movements, and the reasons for skipping exercise movements. To assess the participants' mastery of the exercise movements, descriptive statistics were employed for summarizing the return demonstration performance item and total scores. To investigate the changes before and at three months after the exercise programme, the Wilcoxon signed ranks test was used to compare the mean values of pre-test and post-test health outcome measurements so as to preliminary identify the possible therapeutic values of the exercise regimen (Portney & Watkins, 2009).

Cronbach's alpha coefficients were calculated for the study instruments, including the satisfaction questionnaire, the return demonstration record sheet, the WOMAC and the SF-12, to confirm the internal consistency of the scales (George & Mallery, 2006).

Analysis of Data from the Qualitative Component

Content analysis was employed in the qualitative part of the Phase II study for data analysis. The audio-recorded interviews were transcribed verbatim into Cantonese. Cues including pauses, changes in tone, and particular emotions or events during the interviews were noted by words in brackets, inserted immediately after the corresponding script. The interview data were organized into a table format that was the same as that described in the data analysis of the Phase I study (reported in Chapter 4). Each piece of the transcription was checked and rechecked against the audio records several times on separate dates by the researcher to ensure their accuracy.

All the transcriptions were reviewed several times until the researcher was very familiar with the interview data. Sentences or paragraphs were reviewed within the context of the entire interview to identify and code significant patterns that were descriptions related to perceptions and experiences of participating in the exercise programme or continual practice of the recommended exercise for KOA, or descriptions that hinted at possible improvement to the exercise programme. Subsequently, a list of major categories was developed with reference to the emerging themes from the identified patterns.

The categories were checked and rechecked for internal homogeneity and external heterogeneity, which are two major criteria for constructing categories (Patton, 2002), as mentioned in the data analysis of the Phase I study (reported in Chapter 4). In addition, the set of categories was also checked for completeness to ensure that the interview data were reasonably included in the categories. The categories were used to sort the interview data, and the sorting process was carried out on computer using the copy-and-paste function of Microsoft Word. Data within each major category were then reviewed again to identify subcategories. Checking of objectivity in the development of categories was carried out by inviting a researcher, who was experienced in conducting qualitative data analysis, to read two randomly selected transcriptions and develop categories independently. The categories were then compared and any differences were discussed.

Summary of the Methods

In summary, the main purpose of the Phase II study was to pilot the newly-developed exercise programme. The Phase II study employed a mixed-methods design, which consisted of quantitative and qualitative components.

The sample of the study was obtained from a community centre for older people. The intervention in the study was the newly-developed exercise programme. As for the data collection instruments, the satisfaction questionnaire, exercise diary, and return demonstration performance record sheet were developed by the researcher for assessing the participants' satisfaction with the exercise programme, adherence to the recommended frequency in practising the exercise movements, and mastery of the exercise movements, respectively. In addition, an interview guide and a socio-demographic and clinical data sheet were developed by the researcher, while the WOMAC is a well-validated questionnaire for assessing knee pain, knee stiffness, physical functioning of the knee, and the disease-specific health status of the participants; the SF-12 is also a well-validated questionnaire for assessing the general health status of the participants; knee ROM and the TST are assessments of the physical functioning of the participants. In this section, data collection procedures, ethical considerations, and methods of data analysis were also detailed. The findings obtained from this Phase II study will be summarized and presented in the next section of this chapter.

RESULTS (PHASE II STUDY)

Introduction

This section presents the results of the Phase II study. It consists of two major parts: quantitative and qualitative results from the quantitative and qualitative components of the Phase II study, respectively. The quantitative results are presented prior to the qualitative results. In the first part, the recruitment response, the characteristics of the participants, the attendance rate and the baseline findings of health outcomes of the participants are described.

The objectives of the quantitative component of the Phase II study were: (1) to evaluate the participants' satisfaction with the exercise programme; (2) to examine the participants' adherence in practising the exercise movements according to the recommended frequency; (3) to assess the participants' mastering of the exercise movements; and (4) to assess changes in the participants' health outcomes before and at three months after the exercise programme; the measures of health outcomes included subjective reports on knee pain, knee stiffness, physical functioning of the knee, disease-specific health status and general health status, and objective measures of physical functioning by the measurement of knee ROM and the measurement of muscle strength and endurance of the lower extremities of the participants. Pertinent to these objectives, results on the participants' satisfaction with the exercise programme are presented. This is followed by findings on the participants' adherence to the recommended frequency in practising the exercise movements, and results on the participants' mastering of the exercise movements as reflected by their performance in return demonstrations of the exercise movements. Lastly, changes in the participants' health outcomes before and at three months after the exercise programme are presented. In addition, the internal consistencies of the study's instruments are reported prior to the above-mentioned results as background information for interpretation of the findings. Furthermore, results on test of normality for the health outcome variables are reported prior to the results on changes in the participants' health outcomes.

In the second part, the qualitative findings are presented. The characteristics of the informants are first described. This is followed by an overview of the categories of findings from the semi-structured interviews. Lastly, each of the categories and subcategories are described in detail with verbatim quotes from the participants to illustrate the categories.

Quantitative Results

Recruitment and Response

During the data collection period from mid-June to the end of October 2008, a total of 48 older people had shown interest in enrolling in the exercise programme. Among these 48 older people, 12 were excluded from the study according to the sampling criteria. Another two withdrew when they were asked not to join another exercise programme during the study period. The remaining 34 older people with KOA were recruited into the study. One participant dropped out of the study because she could not be contacted after the first session of the exercise programme. The other 33 participants completed the quantitative component of the Phase II study. Therefore, the final sample of the quantitative component of the Phase II study consisted of 33 participants. The drop-out rate was 0.03%.

The socio-demographic and clinical profile of the participant who dropped out from the study was mainly confined to the mainstream of the final sample. This participant was a 75-year-old widow with a primary education who lived alone in a public rental housing estate. She was retired but was not receiving financial support from the Comprehensive Social Security Assistance scheme. She had a habit of regular exercise and did not require a walking aid. She was diagnosed with right KOA by a doctor two years prior to the study. She had enjoyed good past health, and did not have any known visual or general medical problems. Her body mass index (BMI) was 26.56 kg/m^2. In addition, her pre-test health outcomes were comparable with the mean scores of the participants who completed the study.

Characteristics of the Participants

There were 28 female and 5 male participants in the final sample of the study. Their ages ranged from 61 to 92 years (mean age = 75.03 years; SD = 7.26). Approximately half (N = 17; 51.5%) of the participants were married; the majority of the rest (N = 15; 45.5%) were widowed, while one of them (3.0%) was divorced. Only three (N = 3; 9.1%) of the participants were educated beyond primary school. None of the participants were working. One-third (N = 11; 33.3%) of the participants were living alone. The majority (N = 26; 78.8%) of the participants were living in public rental housing estates. Approximately one-fifth (N = 6; 18.2%) of the participants were supported financially by the Comprehensive Social Security Assistance scheme. Two-thirds (N = 23; 69.7%) of the participants had a habit of exercising regularly. Their BMIs ranged from 18.55 to 33.67 kg/m^2, (mean BMI = 25.45 kg/m^2; SD = 3.93). Five of them were overweight (23 to 25 kg/m^2) and another 21 participants were obese ($>$ 25 kg/m^2) (WHO Expert Consultation, 2004).

Regarding the health history of the final sample, the majority (N = 27; 81.8%)

of the participants had medical follow-up of their KOA by a doctor. The duration of their symptoms of KOA, such as knee pain and stiffness, varied from 2 months to 30 years (mean duration of symptoms = 8.97 years; SD = 7.11). Approximately half (N = 17; 51.5%) of the participants were suffering from bilateral KOA. More than two-fifths (N = 15; 45.5%) of the participants walked with aids in their daily living. Approximately two-thirds (N = 21; 63.6%) of the participants had either eye problems such as a cataract, general medical problems such as hypertension, diabetes mellitus, or respiratory and heart diseases, or both eye and general medical problems. The characteristics of the final sample (N = 33) are presented in Table 5.2.

Table 5.2. Characteristics of the final sample (N=33).

Characteristics		Mean (SD)	Range
Age (years)		75.03 (7.26)	61-92
Body Mass Index (kg / m^2)		25.45 (3.93)	18.55-33.67
Duration of symptoms (years)		8.97 (7.11)	0.2-30
		N	**Percentage (%)**
Gender	Male	5	15.2
	Female	28	84.8
Marital status	Married	17	51.5
	Divorced	1	3.0
	Widow/widower	15	45.5
Educational level	Illiterate	9	27.3
	Below primary	8	24.2
	Primary	13	39.4
	Secondary	3	9.1
Employment	Unemployed	33	100.0
Living arrangements	With relatives/friends	22	66.7
	Alone	11	33.3
Type of residence	Public rental housing estate	26	78.8
	Private flat	7	21.2
Financial condition	Supported by CSSA	6	18.2
	Not supported by CSSA	27	81.8
Regular exercise habit	Yes	23	69.7
	No	10	30.3
Body Mass Index (kg / m^2)	Normal weight (18.5 to 23 kg/m^2)	7	21
	Overweight (23 to 25 kg/m^2)	5	15
	Obese (> 25 kg/m^2)	21	64
Medical follow-up of KOA	Yes	27	81.8
	No	6	18.2
Knee involved	Unilateral	16	48.5
	Bilateral	17	51.5
Use of walking aid	Yes	15	45.5
	No	18	54.5
Medical history	Good past health	12	36.4
	Eye /medical problems	21	63.6

Note: CSSA = Comprehensive Social Security Assistance scheme; KOA = knee osteoarthritis.

Attendance

With regard to the attendance, six of the participants missed one session (i.e., attended 3 out of the 4 sessions) and the other twenty-seven participants fully attended the exercise programme (i.e., attended 4 sessions). Therefore, the average attendance rate was 95.4%. The reasons for the participants' absence from exercise sessions included medical appointments, social activities, and hospital admission due to gastrointestinal problems. There was not a particular pattern which could be noted and there was not any participant who was absent from the last session. Therefore, all the participants in the final sample had been taught about a full set of the seven exercise movements.

Baseline Findings of Health Outcomes

The baseline findings of health outcomes of the participants obtained from the pre-test are presented in Table 5.3. The participants' pain, stiffness, and physical functioning of the affected knee and disease-specific health status were measured using the WOMAC. The baseline findings from the WOMAC showed that the WOMAC subscale and total mean scores ranged from 26.98 to 35.16, and the SDs ranged from 22.48 to 24.32. Hence, the participants did experience the key symptoms of KOA, including pain, stiffness, and difficulties in physical functioning of the affected knee (Bellamy, 2007); the large SDs indicate wide variations among the participants in their experience of these symptoms. Of the three subscale scores of the WOMAC, the mean scores for the pain subscale and the physical functioning subscale were similar (pain: mean = 35.16, SD = 23.59; physical functioning: mean = 35.12, SD = 24.32), while the mean score for the stiffness subscale (mean = 26.98, SD = 23.29) was relatively lower. This indicates that the participants may have experienced more pain and difficulties in physical functioning than stiffness in the affected knee.

The participants' general health status was measured using the SF-12. The SF-12 summary mean scores were 30.41 (SD = 17.07) and 47.21 (SD = 12.89) for the physical and mental health components, respectively. Hence, both the physical and mental health of the participants were suboptimal, with physical health being much poorer than mental health (Lam et al., 2005).

The participants' physical functioning was also measured objectively by knee ROM and the TST. The baseline findings of knee ROM showed that the range of motion of the participants' affected knees ranged from 67 to 117 degrees (mean = 93.27 degrees; SD = 13.27), hence the participants' knee ROM was less than the normal range (Berman et al., 2008). The findings of the TST showed that the time required for the participants to complete the TST ranged from 26 to 120 seconds (mean = 48.82 seconds; SD = 19.26). Hence, there were large variations among the participants in performing the TST, but the participants on average took more time to complete the TST compared with the general population of older Hong Kong Chinese people (MacFarlane et al., 2006). This finding implies a poorer physical functioning in muscle strength and endurance of the lower extremities among the participants of this study.

Table 5.3. Baseline findings of health outcomes of the final sample (N=33).

Pre-test health outcome findings:	Mean (SD)	Range
WOMAC pain subscale score	35.16 (23.59)	0.42-86.25
WOMAC stiffness subscale score	26.98 (23.29)	0.00-84.38
WOMAC physical functioning subscale score	35.12 (24.32)	0.68-89.00
WOMAC total score	33.43 (22.48)	0.42-86.11
SF-12 physical health summary score	30.41 (17.07)	3.0-63.70
SF-12 mental health summary score	47.21 (12.89)	16.90-70.00
Knee range-of-motion (degrees)	93.27 (13.27)	67-117
Timed-Stands Test (seconds)	48.82 (19.26)	26-120

Note: WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index (Visual Analogue Scale); SF-12 = Short Form of the Medical Outcome Study questionnaire (12 items).

Internal Consistency of the Study's Instruments

This section reports the results of internal consistency tests of the study's instruments. The internal consistency of the study's instruments was assessed by calculating the Cronbach's Alpha coefficients for the satisfaction questionnaire, and return demonstration performance record sheet, WOMAC pre-test, WOMAC post-test, SF-12 pre-test, SF-12 post-test, and these were all above 0.7 (i.e., well above the level of acceptance) (Portney & Watkins, 2009). Table 5.4 summarizes the findings of the Cronbach's Alpha coefficients of the study's instruments.

Table 5.4. Internal consistency of scales as shown by the Cronbach's alpha coefficients.

Scale	Cronbach's Alpha	Number of items
Satisfaction questionnaire	0.837	10
Return demonstration performance record sheet	0.799	7
WOMAC pre-test	0.971	24
WOMAC post-test	0.950	24
SF-12 pre-test	0.850	12
SF-12 post-test	0.858	12

Note: WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index (Visual Analogue Scale); SF-12 = Short Form of the Medical Outcome Study questionnaire (12 items).

Participants' Satisfaction with the Exercise Programme

This section focuses on the participants' satisfaction with the exercise programme as reflected in the satisfaction score at the end of the last session of the exercise programme. The possible range of the satisfaction score was from 0 to 100 after transforming the raw total score into a 0–100 scoring system. The participants' satisfaction score, therefore, ranged from 75 to 100 (mean = 90.15; SD = 8.05), indicating an overall high level of satisfaction with the exercise programme. Regarding the individual items, the mean scores ranged from 3.39 (SD = 0.70) to 3.88 (SD = 0.33) on a five-point Likert scale ranging from 0 to 4. A summary of the responses to the individual items of the satisfaction questionnaire is presented in Table 5.5.

Table 5.5. Summary of responses to individual items on the satisfaction questionnaire.

Items	Strongly Agree (4) f(%)	Agree (3) f(%)	Neutral (2) f(%)	Disagree (1) f(%)	Strongly Disagree (0) f(%)	Mean (SD)
1. The content of the exercise programme is suitable for me.	21(63.6)	12(36.4)	0(0)	0(0)	0(0)	3.64 (0.49)
2. The arrangement of frequency and duration of the exercise programme is appropriate.	17(51.5)	16(48.5)	0(0)	0(0)	0(0)	3.52 (0.51)
3. The amount of material covered in the exercise programme is appropriate.	21(63.6)	11(33.3)	1(3.0)	0(0)	0(0)	3.61 (0.56)
4. The discussion part of the exercise programme helps me to integrate the recommended exercise into my daily routine.	22(66.7)	11(33.3)	0(0)	0(0)	0(0)	3.67 (0.48)
5. I am satisfied with the teaching of the coach.	29(87.9)	4(12.1)	0(0)	0(0)	0(0)	3.88 (0.33)
6. I can memorize the recommended exercises.	16(48.5)	15(45.5)	1(3.0)	1(3.0)	0(0)	3.39 (0.70)
7. I think the recommended exercise is not difficult to follow.	16(48.5)	17(51.5)	0(0)	0(0)	0(0)	3.48 (0.51)
8. I have time to practise the recommended exercise in my daily routine.	16(48.5)	17(51.5)	0(0)	0(0)	0(0)	3.48 (0.51)
9. I am confident that I can develop the habit of practising the recommended exercise in my daily routine.	19(57.6)	14(42.4)	0(0)	0(0)	0(0)	3.58 (0.50)
10. Overall, I am satisfied with the exercise programme.	27(81.8)	6(18.2)	0(0)	0(0)	0(0)	3.82 (0.39)

The items most highly rated by the participants were items 5 and 10, indicating their high level of satisfaction with the teaching approach and the overall content and arrangement of the exercise programme. The item with the lowest rating by the participants was item 6. This item was also rated with the widest variations of responses (SD = 0.70); it was the only item with a participant rating 'disagree' in response to the item sentence. Hence, this participant was not confident in her ability to memorize the recommended exercises.

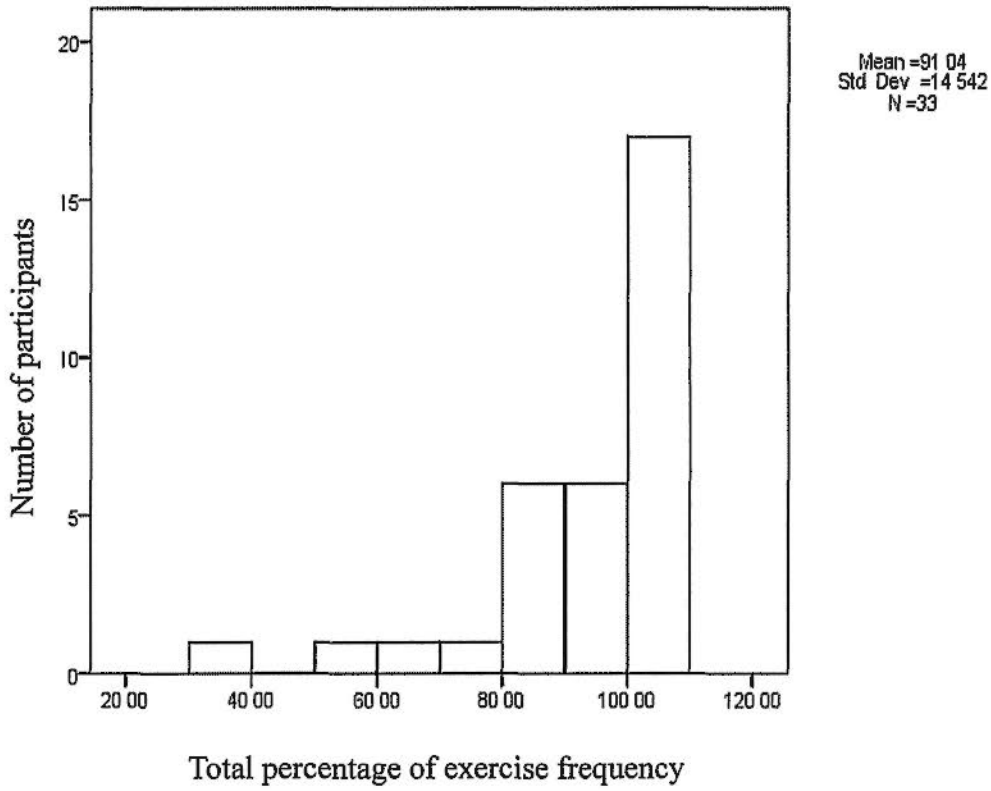
In the section for "Other Comments" on the questionnaire, three participants gave comments and these were mainly positive, including a note of thanks, appreciation for the exercise teaching, and a request for more exercise programmes.

Participants' Adherence to Practising the Exercise Movements

This section presents the participants' exercise adherence in terms of practising the seven exercise movements according to the recommended frequency of practice. The participants were advised to practise each of the seven exercise movements twice every day. The period for recording the frequency of practice was from the day after the last session of the exercise programme to 12 weeks thereafter.

The participants' frequency of exercise practice ranged from 39.4% to 100%, with a mean percentage of 91.04% (SD = 14.54), indicating an overall high level of adherence to the recommended frequency of exercise practice. Only one participant failed to attain a level of adherence of 50% to the recommended frequency of practice, while the majority (N = 29) of participants attained a level of adherence of higher than 75%. Moreover, more than half (51.5%, N = 17) of the participants adhered fully to the recommended frequency of exercise practice. Hence, the participants' level of adherence in terms of frequency of exercise practice was high and greatly skewed. Figure 5.2 shows the histogram of the participants' adherence to the programme in terms of percentage of practising the exercise at the recommended frequency.

Figure 5.2. Adherence of participants in terms of percentage of practising the exercise at the recommended frequency.



Regarding the level of adherence to individual exercise movements, the mean percentages of exercise practice according to the recommended frequency ranged from 89.20% (SD = 18.08) to 92.15% (SD = 12.90). Hence, variations in mean percentages of exercise practice between the seven exercise movements were small (i.e., less than 3%). A summary of the participants' adherence to the individual exercise movements is presented in Table 5.6.

Table 5.6. Summary of frequency of practice of individual exercise movements.

Exercise movement	Below 50%	50% to <75%	75% to <90%	90% to <100%	100%		
	Frequency of practice						
	f(%)	f(%)	f(%)	f(%)	f(%)	Mean (SD)	Range
1. Raise leg	1(3.0)	2(6.1)	7(21.2)	6(18.2)	17(51.5)	92.15 (12.90)	48.4 - 100
2. Kick back	1(3.0)	3(9.1)	5(15.2)	7(21.2)	17(51.5)	91.54 (14.22)	40.3 - 100
3. Stretch the back of knee	1(3.0)	3(9.1)	5(15.2)	7(21.2)	17(51.5)	91.61 (13.52)	48.4 - 100
4. Stretch the calf	1(3.0)	3(9.1)	6(18.2)	6(18.2)	17(51.5)	91.00 (15.02)	38.7 - 100
5. Raise leg ± resistance from an exercise band	1(3.0)	3(9.1)	6(18.2)	6(18.2)	17(51.5)	91.10 (14.86)	37.1 - 100
6. Squat to half way	1(3.0)	3(9.1)	7(21.2)	5(15.2)	17(51.5)	90.69 (15.35)	32.3 - 100
7. Rise up from chair	2(6.1)	3(9.1)	5(15.2)	6(18.2)	17(51.5)	89.20 (18.07)	30.6 - 100

Regarding the reasons for skipping exercise, more participants (N = 9; 27.3%) skipped exercise because they 'went out', and fewer participants (N = 1; 3.0%) skipped exercise because they felt 'depressed'. The other reasons given for skipping exercise ('pain', 'busy', 'tired', 'ill', or 'forgot') were chosen in fairly equal numbers. A summary of the frequency of reasons for skipping exercise movements by the number of participants is presented in Table 5.7.

Table 5.7. Summary of frequency of reasons for skipping exercise movements by number of participants.

Exercise \ skip reason	Pain [a] f(%)	Busy [a] f(%)	Tired [a] f(%)	Ill [a] f(%)	Depressed [a] f(%)	Forgot [a] f(%)	Went Out [a] f(%)
1. Raise leg	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)
2. Kick back	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)
3. Stretch the back of knee	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)
4. Stretch the calf	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)
5. Raise leg ± resistance from an exercise band	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)
6. Squat to half way	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)
7. Rise up from chair	6(18.2)	4(12.1)	6(18.2)	6(18.2)	1(3.0)	6(18.2)	9(27.3)

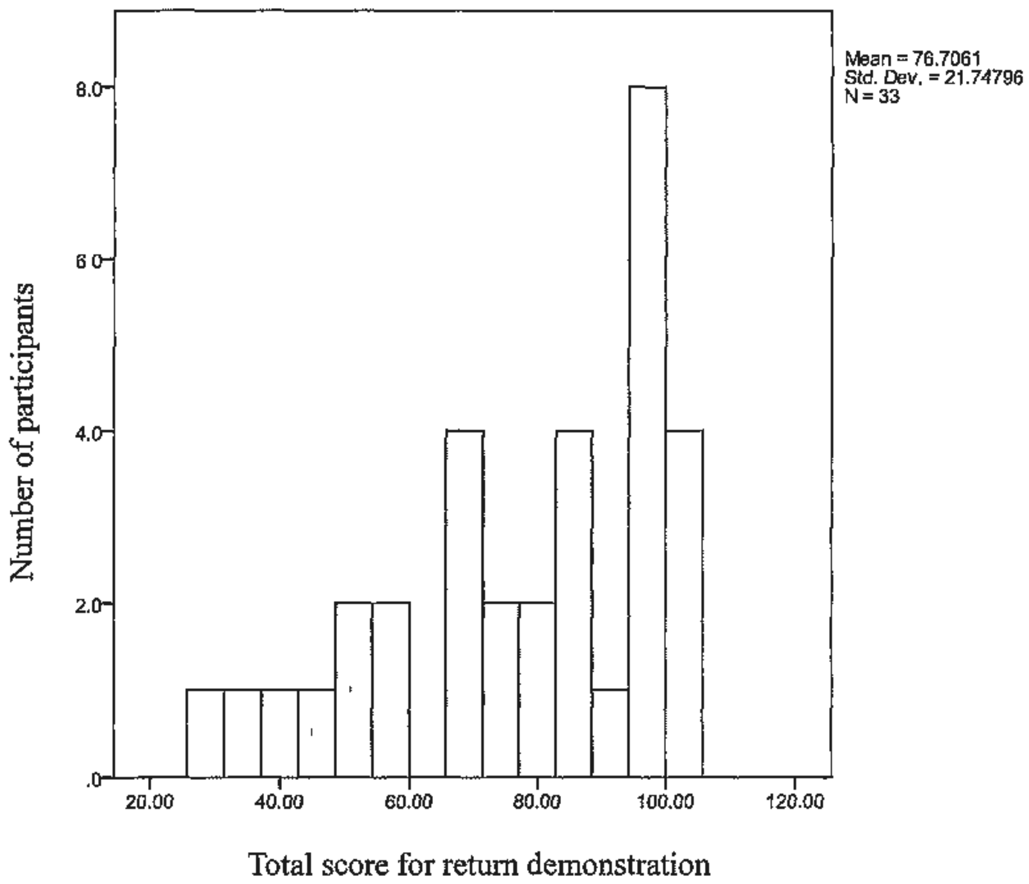
Note: [a] The total number of participants = the divider of the frequency (f) = 33.

Participants' Mastering of the Exercise Movements

This section reports the participants' mastering of the exercise movements, as reflected by the return demonstration performance scores for the seven exercise movements at the post-test session three months after the exercise programme. The return demonstration performance of each of the exercise movements was individually rated on a six-point Likert scale ranging from 0 to 5, while a total score was obtained by summating the scores of the seven items and transformed into a 0–100 scoring system. Therefore, the possible range of the return demonstration performance score was from 0 to 100, with a higher score indicating better mastering of the exercise movements.

The participants' return demonstration performance scores ranged from 28.57 to 100, with a mean of 76.71 (SD = 21.75), indicating an overall good performance in mastering of the exercise movements. Furthermore, 87.8% (N = 29) of the participants obtained a return demonstration performance score higher than 50, while 57.5% (N = 19) obtained a score higher than 75. Moreover, 12% (N = 4) of them obtained a full score. Hence, the return demonstration performance score was skewed towards the high side, although the variation of the score among the participants was wide. Figure 5.3 shows the histogram of the return demonstration performance scores of the participants.

Figure 5.3. The return demonstration performance scores of the participants.



Regarding the performance of the individual exercise movements, the mean scores ranged from 2.00 (SD = 2.15) to 4.97 (SD = 0.17) on a six-point Likert scale ranging from 0 to 5. The mode for most of the items was 5, indicating a totally correct return demonstration of the exercise movement. A summary of the return demonstration performance scores for individual exercise movements is presented in Table 5.8.

Table 5.8. Summary of the return demonstration performance scores for individual exercise movements.

Exercise movement	Score 0 f (%)	1 f (%)	2 f (%)	3 f (%)	4 f (%)	5 f (%)	Mode	Mean (SD)
1. Raise leg	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.0)	32 (97.0)	5	4.97 (0.174)
2. Kick back	1 (3.0)	0 (0)	0 (0)	0 (0)	3 (9.1)	29 (87.9)	5	4.76 (0.902)
3. Stretch the back of knee	16 (48.5)	0 (0)	4 (12.1)	1 (3.0)	5 (15.2)	7 (21.2)	0	2.00 (2.15)
4. Stretch the calf	5 (15.2)	0 (0)	3 (9.1)	1 (3.0)	3 9.1)	21 (63.6)	5	3.82 (1.88)
5. Raise leg ± resistance from an exercise band	7 (21.2)	0 (0)	2 (6.1)	1 (3.0)	1 (3.0)	22 (66.7)	5	3.67 (2.09)
6. Squat to half way	8 (24.2)	0 (0)	0 (0)	1 (3.0)	7 (21.2)	17 (51.5)	5	3.52 (2.08)
7. Rise up from chair	0 (0)	2 (6.1)	2 (6.1)	6 (18.2)	3 (9.1)	20 (60.6)	5	4.12 (1.27)

The best performed exercise movement was exercise 1 (raise leg), with only one participant not obtaining a full rating. The most poorly performed exercise movement was exercise 3 (stretch the back of knee), with almost half (N = 16, 48.5%) of the participants not being able to return-demonstrate the exercise at the post-test session.

Therefore, the participants were in general highly satisfied with the exercise programme. The item with the highest rating was about the teaching approach and the item with the lowest rating was about the ability to memorize the recommended exercise. The majority of participants demonstrated a high level of adherence (over 75%) to the recommended frequency in practising the exercise movements. The adherence rates did not vary greatly between the seven exercise movements. The most common reason for skipping exercise was 'went out', and the most uncommon reason was feeling 'depressed'; the other reasons given were 'pain', 'tired', 'ill', 'busy', and 'forgot'. The participants' mastering of the exercise movements varied from individual to individual but overall, good performances were demonstrated. The best performed exercise was a range-of-motion exercise and the most poorly performed exercise was an exercise to stretch the back of knee.

Results of Test of Normality for Outcome Variables

This section reports the results of the test of normality for the study's health outcome variables by using the Kolmogorov-Smirnov one-sample tests (Pallant, 2001). According to Pallant (2001), a non-significant Kolmogorov-Smirnov test result indicates normality. The pre-test and post-test health outcomes and changes in these health outcomes before and at three months after the exercise programme were tested for normality. Changes in health outcomes were obtained by subtracting the pre-test scores from the post-test scores. Almost half of the test results were significant, indicating that almost half of these variables were not normally distributed. Thus, non-parametric statistical tests were used for data analysis in this study. The results of the Kolmogorov-Smirnov one-sample tests are presented in Table 5.9.

Table 5.9. Test of normality using the Kolmogorov-Smirnov one-sample tests.

Outcome variables	Kolmogorov-Smirnov[a]		
	Statistic	df	p value
WOMAC pain subscale score – pre-test	0.099	33	0.200* ^{ns}
WOMAC stiffness subscale score – pre-test	0.131	33	0.160 ^{ns}
WOMAC physical functioning subscale score – pre-test	0.166	33	0.021
WOMAC total score – pre-test	0.119	33	0.200* ^{ns}
SF-12 physical health summary score – pre-test	0.117	33	0.200* ^{ns}
SF-12 mental health summary score – pre-test	0.078	33	0.200* ^{ns}
Knee range of motion (degrees) – pre-test	0.098	33	0.200* ^{ns}
Timed-Stand Test (seconds) – pre-test	0.182	33	0.007
WOMAC pain subscale score – post-test	0.195	33	0.003
WOMAC stiffness subscale score – post-test	0.215	33	0.000
WOMAC physical functioning subscale score – post-test	0.162	33	0.027
WOMAC total score – post-test	0.174	33	0.012
SF-12 physical health summary score – post-test	0.082	33	0.200* ^{ns}
SF-12 mental health summary score – post-test	0.186	33	0.005
Knee range of motion (degrees) – post-test	0.129	33	0.176 ^{ns}
Timed-Stand Test (seconds) – post-test	0.151	33	0.054
Change in WOMAC pain subscale score	0.166	33	0.021
Change in WOMAC stiffness subscale score	0.164	33	0.024
Change in WOMAC physical functioning subscale score	0.182	33	0.007
Change in WOMAC total score	0.135	33	0.134 ^{ns}
Change in SF-12 physical health summary score	0.098	33	0.200* ^{ns}
Change in SF-12 mental health summary score	0.088	33	0.200* ^{ns}
Change in knee range of motion (degrees)	0.101	33	0.200* ^{ns}
Change in Timed-Stand Test (seconds)	0.135	33	0.136 ^{ns}

Note: WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index (Visual Analog Scale); SF-12 = Short Form of the Medical Outcome Study questionnaire (12 items).

a. Lilliefors Significance Correction.

* .This is a lower bound of the true significance.

^{ns}. A non-significant result with p >0.05.

Changes in the Participants' Health Outcomes

This section presents the health outcome changes of the participants before and at three months after the exercise programme. The majority of the health outcomes improved significantly among the participants, as analysed by the Wilcoxon signed ranks tests. The significantly improved health outcomes included subjective reports on (1) knee pain as measured by the WOMAC pain subscale score (43.2%), (2) knee stiffness as measured by the WOMAC stiffness subscale score (43.5%), (3) physical functioning of the knee as measured by the WOMAC physical functioning subscale score (50%), (4) disease-specific health status as measured by the WOMAC total score (45.9%), and (5) the mental health aspect of general health status as measured by the SF-12 mental health summary score (16.3%), and objective measures of physical functioning as indicated by (6) knee ROM (13.5%), and (7) the TST (15.8%), which is a measure of the muscle strength and endurance of the lower extremities. Regarding the physical health aspect of the general health status of the participants, there were improvements, as measured by the SF-12 physical health summary score (pre-test: mean = 30.14, SD = 17.07; post-test: mean = 36.36, SD = 16.10). However, the improvement did not attain a statistically significant difference ($p = 0.085$) between the pre-test and post-test physical health summary mean scores. Table 5.10 summarizes the findings of the pre-test and post-test health outcome changes of the participants.

Table 5.10. Comparisons of health outcomes before and at three months after the exercise programme using the Wilcoxon signed ranks tests.

Health outcome variables	N	Mean (SD)	Range	Z	P value (2-tailed)
WOMAC pain subscale score – pre-test	33	35.16 (23.59)	0.42-86.25	-3.919[b]	0.000
WOMAC pain subscale score – post-test	33	19.97 (19.96)	0.00-75.62		
WOMAC stiffness subscale score – pre-test	33	26.98 (23.29)	0.00-84.38	-3.416[b]	0.001
WOMAC stiffness subscale score – post-test	33	15.22 (18.00)	0.00-58.32		
WOMAC physical functioning subscale score – pre-test	33	35.12 (24.32)	0.68-88.99	-4.333[b]	0.000
WOMAC physical functioning subscale score – post-test	33	17.55 (14.90)	0.00-52.36		
WOMAC total score – pre-test	33	33.43 (22.48)	0.42-86.11	-4.440[b]	0.000
WOMAC total score – post-test	33	18.08 (16.01)	0.00-59.63		
SF-12 physical health summary score – pre-test	33	30.41 (17.07)	3.00-63.70	-1.724[a]	0.085 [ns]
SF-12 physical health summary score – post-test	33	36.36 (16.10)	-7.54-62.89		
SF-12 mental health summary score – pre-test	33	47.21 (12.89)	16.90-70.00	-3.100[a]	0.002
SF-12 mental health summary score – post-test	33	54.46 (11.63)	28.51-71.21		
knee range-of-motion – pre-test (degrees)	33	93.27 (13.27)	67-117	-4.586[a]	0.000
knee range-of-motion – post-test (degrees)	33	105.91 (11.19)	75-130		
Timed-Stands Test – pre-test (seconds)	33	48.82 (19.26)	26-120	-2.732[b]	0.006
Timed-Stands Test – post-test (seconds)	33	41.09 (11.85)	25-66		

Note: WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index (Visual Analogue Scale); SF-12 = Short Form of the Medical Outcome Study questionnaire (12 items).

a. Based on negative ranks; b. Based on positive ranks. [ns]. A non-significant result with $p > 0.05$.

Therefore, the effect of the exercise programme on improving the health status of the participants in terms of their subjective reports on knee pain, knee stiffness, physical functioning of the knee, disease-specific health status, and the mental health aspect of their general health status, and objective measures of their physical functioning in knee ROM and the muscle strength and endurance of the lower extremities, were implied from the findings. The physical health aspect of their general health status was improved but did not attain a statistically significant level.

Qualitative Findings

Characteristics of the Informants

Six participants who had completed the quantitative component of the Phase II study were recruited as informants for the semi-structured interviews of the qualitative component of the study. Four out of the six informants were female. Their ages ranged from 63 to 80 years, with a mean age of 73.17 years (SD = 6.49). Their educational level ranged from illiterate to secondary level. Four of them were widowed and two of them were married. Four of them were living in public rental housing estates and two of them were living in private flats. Four of them were living alone and two of them were living with relatives. Only one of them was supported financially by the Comprehensive Social Security Assistance scheme.

Three of them had a habit of exercising regularly. Their BMIs ranged from 20.68 to 32.55 kg/m^2, with a mean of 26.74 kg/m^2 (SD = 4.48). They were equally distributed into the categories of normal BMI (N = 2), overweight (N = 2), and obese (N = 2). Their duration of symptoms of KOA ranged from 5 months to 20 years, with a mean duration of 7.56 years (SD = 8.06). Two of them were suffering from bilateral KOA. Four of them walked with aids before the exercise programme. Four of them had one or more comorbidities, including hypertension, diabetes mellitus, and heart disease.

Regarding the participants' satisfaction with the exercise programme, the satisfaction scores ranged from 75 to 100, with a mean score of 88.75 (SD = 11.48). The return demonstration performance scores ranged from 71.43 to 94.29, with a mean score of 86.67 (SD = 8.41). The level of adherence to practising the exercise movements according to the recommended frequency ranged from 50% to 100%, with a mean of 84.81% (SD = 19.91). The characteristics of the informants are presented in Table 5.11.

Table 5.11. Characteristics of the informants.

Code	Age (years)	Gender	Educa-tional level	Marital status	Residence	Living arrange-ments	Recipient of CSSA	Regular exercise habit	Duration of KOA symptoms	Knee involve-ment	Use of walking aids	No. of co-morbidities	BMI (kg/m^2)	Sat. score	Return demo. score	% of exercise practice
1	80	Female	Primary	Widow	Public rental housing	Alone	No	Yes	5 months	Left	Yes	0	20.68	97.5	94.29	100.0
2	72	Female	Below primary	Married	Public rental housing	With relatives	No	Yes	11 years	Left	Yes	2	32.55	75.0	71.43	82.7
3	76	Female	Illiterate	Widow	Public rental housing	Alone	Yes	No	20 years	Both	Yes	3	26.99	100.0	82.86	100.0
4	79	Male	Primary	Widower	Public rental housing	Alone	No	Yes	12 years	Both	Yes	2	27.48	87.5	91.43	100.0
5	69	Female	Secondary	Widow	Private flat	Alone	No	No	1 year	Left	No	1	30.18	75.0	88.57	50.0
6	63	Male	Secondary	Married	Private flat	With relatives	No	Yes	1 year	Left	No	0	22.58	97.5	91.43	76.2

Note: BMI = Body Mass Index; CSSA = Comprehensive Social Security Assistance; KOA = knee osteoarthritis; sat. score = satisfaction score (possible range: 0–100); return demo. score = return demonstration performance score (possible range: 0–100); % of exercise practice = percentage of exercise practice according to the recommended frequency.

Categories Identified from the Interview Data

This section reports the categories identified from the interview data of the six informants. There were four major categories identified from the interview data. As presented in Table 5.12, the four major categories were (1) satisfaction with the exercise programme, (2) mastering of the exercise movements, (3) experience of the exercises' effects, and (4) integration of the exercises into the daily routine.

Table 5.12. Major categories identified from the interview data of the six informants.

1.	Satisfaction with the exercise programme
2.	Mastering of the exercise movements
3.	Experience of the exercises' effects
4.	Integration of the exercises into the daily routine

All the informants were in general satisfied with the content and arrangement as well as the teaching of the exercise programme. However, there were also some hints for improvements to the exercise programme implied from the interview data. The participants' mastering of the exercise movements began with return demonstrations and corrections in class. The participants also made use of the supplementary materials, including the leaflet and poster, for review of the exercise movements at home. They could gradually memorize all the exercise movements and developed confidence in mastering them. The participants practised the exercises and experienced their effects during the course. Their experience of the exercises' effects further promoted their interest and determination in continual practice of the exercise movements. A positive reinforcing cycle was therefore developed and the participants were motivated to integrate the exercise into their daily routine. Each of the major categories mentioned above is reported in further detail in the following sections, with the support of verbatim quotes from the informants.

Satisfaction with the Exercise Programme

Satisfaction with the exercise programme refers to the informants' satisfaction with the content, arrangement, and teaching of the exercise programme. The informants did not identify areas for improvement in the exercise programme when they were asked to provide suggestions for improvement. However, some areas for improvement were hinted at the interview data, which referred to difficulties with some of the exercise movements, understanding of the information given, maintaining the focus of group sharing sessions, and catering for the variations in learning ability in group teaching.

Content

The content of the exercise programme consisted of three major components: the teaching of exercise skills, the knowledge input, and the sharing sessions. In general, the informants commented that the content of the exercise programme suited them as it was simple and of the right amount; the following is quoted verbatim from a female informant:

I understand the content of the course very well... It's suitable because it's simple... I think the content is just right, because I'm stupid and can't learn too much. That's true. The amount is just right (Informant 5).

<u>*Teaching of exercise skills*</u>

In regard to teaching the exercises, the informants appreciated the opportunity to learn a set of exercises for the knees, as exemplified by the following quote from an informant:

We don't know how to stretch or kick our legs, because we haven't learnt it before... We know how to do it after they have taught us. Now, I can practise the same movements as they taught me at home (Informant 1).

The informants also appreciated the simplicity of the exercise movements, which made them easy to learn. For example, one female informant compared the learning of this set of exercise movements with her previous experience of learning Tai Chi. She demonstrated her interest in continuing with the exercise practice at home:

> *The movements they taught are simpler, so it's easy for old people like us to learn. There're other courses that taught us more, but we forgot when we got home after the class. ... I took Tai Chi courses before, but I couldn't manage. When I was home, I didn't know how to do it. These exercises are very simple ... I could pick them up, and I'm willing to do it. There's no difficulty. I'm very interested in these exercises* (Informant 1).

They also commented that the exercise movements were suitable for elderly people, as exemplified by the following quote from an informant:

> *This exercise... I don't have much difficulty. ...It's just like this. You straighten your leg, and then bend it. It's very easy. It's done in a sitting position. There's no problem. I think this exercise is suitable for the elderly. ... This is the most suitable. I've the*

ability to do it (Informant 3).

However, one or two of the exercise movements which required more effort of the quadriceps muscle might pose some difficulties for some participants. Two informants found one of the exercise movements a little difficult:

> *The 'sitting on air' is a bit difficult. I'm heavy, so it's more difficult to sit like that. Well, I'll still do it. It's fine. At first I had to support my body with both hands when I did it. With time, I'm able to do it with the support of one hand only* (Informant 4).

> *I'm clumsy. For example, I'm not able to do the one that involves standing up and sitting down well. When I sit down, my lower back doesn't have enough strength. It's not easy for my legs* (Informant 2).

<u>*Knowledge input*</u>

The knowledge part of the exercise programme aimed at enhancing the participants' understanding of the exercises' effects, types of exercise, and exercise-related safety issues. The informants found that this part enhanced their knowledge of exercise. One male informant, based on his previous experience of other exercise classes, did not expect the knowledge input when he enrolled in the exercise programme; however, after participating in the exercise programme, he stated that he found it useful:

> *At first I thought we would be practising the whole time, like in Tai Chi... I mean, they would teach you, and you would go afterwards... In fact it's better than what I'd imagined... At least they referred to pictures when they talked.... Hm... If you do this exercise, it'd help you here... Hmm... It'd help your muscles... This is so that you have more strength... This way, we know a little bit more... If we only did the exercises, I wouldn't have known that...* (Informant 6).

However, some participants might have difficulties in understanding the information provided in the exercise programme. One informant reported that she did not understand the talk at the beginning but she finally understood after some questions and answers between the other participants and the instructor. She said:

> *As you're asking me, let me tell you ... Hm... When she was talking about the benefits of exercising ... Why do we need to do exercise? ... At first I didn't quite understand ... I sat there and listened ... I thought I was not quite understanding ... I*

didn't ask ... later when some people asked questions and she answered them ... then I understood... (Informant 2).

Sharing session

The sharing part of the exercise programme aimed at assisting the participants to develop strategies for practising the exercise movements in their daily routine according to the recommended frequency. However, this part of the programme might be perceived as an opportunity for social chat instead of a time of sharing how they might integrate the exercise into their daily routine. Only one informant was able to give feedback on the sharing session to the interviewer. The majority of informants showed that they considered it to be time to chat when they were asked about the sharing session by the interviewer. The only informant who remembered the group sharing part was a male participant. He commented that the group sharing was sometimes unfocused:

During the group sharing... Sometimes the elderly went off track... They had to be brought back to the topic as they were talking...[laughter]...It's a chat... (Informant 6).

Class and venue arrangement

The informants were also satisfied with the frequency and duration of the class. They commented that it was adequate for learning the exercise movements. The repeat class arrangement was found useful by two informants. They had changed their class time once so that they managed full attendance and learnt all the exercise movements. In addition, they found the venue of the class convenient, as exemplified by the following quote from a female informant:

> *It's enough to have four classes, each lasting one hour... We go home and practise. Hm... That's enough. When I'm home... I refer to the leaflet to learn, and I follow those practices... It's convenient to have the class held at the centre... I wouldn't be able to go if it was far away... The reason is... It's not easy for me to board or exit public transport vehicles...Sometimes the vehicles are high, so it's difficult to get down... So it's okay if it takes place near home!* (Informant 2).

Teaching approach

As for the teaching approach, the informants were satisfied with the teaching approach of the instructor and the use of group teaching in the exercise programme. In regard to the teaching of the exercises, the informants showed appreciation of the lively teaching style of the instructor. One informant said:

I find the classes quite lively ... For example, she explained ... it was to help improve my muscle strength... It's like pork shank... The muscle will become firmer... That's a livelier way... she used words like 'pork shank'... That's livelier... When people hear this, they understand... and they're more relaxed... They're less tense... So it's easier to learn... (Informant 6).

The informants expressed satisfaction with the clear explanations and patience of the instructor when she was teaching the exercises. This is exemplified by the following quotes:

I think the instructor taught very clearly. She showed us how the exercise was done... (Informant 3).

Her teaching was very clear. Nurse Lee taught us step by step. We're old, and we learn much more slowly. She taught us with patience. She taught us very clearly, and the pace was just right (Informant 4).

Group teaching

The group teaching approach was welcomed by all the informants. They expressed a preference for group teaching over individual teaching as there was social support among the participants. One female informant said they could encourage and help each other:

> *It's good that the elderly can take classes together like this... I mean, we all... The elderly sometimes encourage each other, and they share their knowledge of what others don't know. There's a woman who lives on the same floor, and I always ask her whether she has done the stamping. We remind each other and help each other* (Informant 1).

One male informant described the group as feeling like a family:

> *It's better to learn together as a group. We all came here... We know each other, and it feels like we're a family, a whole. Of course it's better than being alone. It's not fun to come and learn alone, right?* (Informant 4).

Group teaching was also perceived as being less stressful as the participants could look at others if they forgot the exercise movements:

> *During the class... Many people did it together, and that's better. If you do it alone, it's like you're a crazy woman [laughter]. Sometimes when I forgot, I could look at how others were doing it. It's less embarrassing* (Informant 5).

Nevertheless, group teaching was limited in terms of catering for the variations in learning ability among the participants. For instance, a male participant with better learning ability made the following point:

> *I did it with the whole class... Some of the classmates are older, and I feel that... There are parts that they weren't able to learn as quickly... Also, the movement is more difficult for them... Hm... And their memory is poor... They wanted to do it, but they're less flexible when doing it... If you teach at a faster pace so as to teach more, they wouldn't be able to learn... The problem is, if you teach more difficult movements, they wouldn't be able to pick them up... Now the method of teaching and the content are just right* (Informant 6).

Therefore, the informants were in general satisfied with the exercise programme as they found the content and arrangement suited them. They appreciated the teaching approach that enabled them to obtain the knowledge and skills. They also welcomed the arrangement of group teaching so that they could have social support in learning the exercise. However, some informants found difficulties with one of the exercise movements. In addition, some informants might have had difficulties in learning the information and skills if they had not had further explanations in the question and answer session. Moreover, the majority of informants perceived the group sharing session as a chat more than a support for developing strategies to integrate the taught exercises into their daily routine.

Mastering of the Exercise Movements

Mastering of the exercise movements refers to the ability of the participants to perform the exercises correctly. All the informants reported that the return demonstration and correction of the exercise movements were useful for learning the exercise. They also required the assistance of the supplementary materials for reviewing the exercise movements at home at the beginning of the course. Most of the informants claimed that they could memorize the exercise movements after a certain period of time. However, some participants might require assistance from relatives in mastering the exercise movements. In addition, some mistakes in performing the exercise movements were observed and the participants' exercise skills were corrected in the post-test session.

Return demonstration and correction of exercise movements

The informants reported their mastering of the exercise skills firstly through the return demonstration and correction of exercise movements in the exercise programme. This is exemplified by the following quotes:

> *We learnt to master it ... If we did it incorrectly, she would teach us so that we're able to do it correctly* (Informant 3).

> *We learn together... They follow up on us... They pick up our mistakes. We do it according to their instructions...When we didn't do the movement correctly, she would tell us how to do it* (Informant 4).

Assistance of supplementary materials

The informants also learnt and mastered the exercise movements with the assistance of the supplementary materials, including a leaflet and a poster which contained pictures and instructions for performing the exercise movements. It took some time for the informants to memorize all the exercise movements. One male informant said:

> *I can remember, because there're only a few things. We follow the order, and we're shown pictures. At first, we did it step by step. I mean, at first we certainly had to look at the pictures when we practised. We couldn't practise without the pictures. We still needed to look at the pictures during the practice, even after doing it 8 or 10 times. After doing it 8 to 10 times, we could remember even without looking at the pictures* (Informant 4).

One informant, whose educational level was below primary, could not read the instructions on the supplementary materials. Her relatives assisted her by reading and explaining the instructions to her so that she gradually mastered the exercise movements when she practised the exercise at home. She said:

> *If I didn't understand, I'd look and follow. Sometimes when the children are free, I ask them how it's done. They'd teach me how it's done. My grandson does it with me... It's fun! We do it together...* (Informant 2).

Corrections at post-test session

Although the informants thought that they could master the exercise movements quite well, the majority of them made minor mistakes that were corrected in the post-test session. The correction was accepted by the informants, as one female informant reported:

> *I came back the other day, and Nurse Chiu interviewed me. Actually there's a movement that I did incorrectly. I dare not pull the rubber band with too much force... Nurse Chiu asked us to do it like this... We have to kick high when we try to cross the rubber band. Going horizontal is incorrect. I know that I was doing it incorrectly. I had to correct myself... I have to kick high. Now I know. If Nurse Chiu didn't come and test me, I'd have continued straightening my leg horizontally, not knowing that the correct way is to kick high... It's good to have some follow-up* (Informant 1).

Therefore, the mastering of the exercise movements by the participants began with the return demonstration and correction of the exercise movements in the exercise class. The participants also practised the exercise movements at home with the assistance of the supplementary materials. Progressively, they could memorize all the exercise movements. Participants with difficulties in reading written materials might require assistance from relatives to understand the supplementary materials. The mistakes in performing the exercise movements were being corrected at the post-test session.

Experience of the Exercises' Effects

Experience of the exercises' effects refers to the informants' experience of the exercises' effects on various aspects of their physical and psychological health.

Reduction of knee pain and increase in knee ROM

All the informants reported their experience of feeling alleviation of the symptoms of KOA. For example, one female informant noticed an increase in knee range-of-motion and a reduction of knee pain after practising the exercises. She also pointed out that she did not experience such effects with her previous morning stroll. She said:

> *My knees are more flexible, and they're less painful when I walk. I know as I walk. I used to have pain when I took a walk in the park every morning. I could walk down a few flights of stairs at most. After that, I had to hold something for support... I had to*

bring an umbrella when I walked down every day. Sometimes, when there was pain, I couldn't walk. Now I don't need to bring an umbrella when I walk down. The most important thing is that after doing this exercise, my knees have become more flexible, and there's no more pain. Walking is more convenient, and I don't need to use an umbrella as a walking aid (Informant 1).

Improvement in leg strength and knee stability

In addition to a reduction of knee pain or stiffness, the informants also experienced an improvement in leg strength and knee stability, as exemplified by the following quotes from the informants:

I do it every day. Yes, now the condition of my knee has improved. There's no more cracking sound. There was a cracking sound in the past. I felt like I would be kneeling. Now my knee has more strength (Informant 3).

At first, before I came, I often lost strength and had the tendency to kneel... This happened, for example, after standing up for a long time... I haven't noticed this happening recently. The frequency reduced. Another problem was with weather... Now this is not a problem... There were two typhoons in the past two months, but I *didn't have pain* (Informant 6).

Improvement in physical functioning, sleep, and emotions

In addition to the reduction of the symptoms of KOA and the improvement in thigh strength, the informants experienced other health improvements, including better physical functioning (e.g., the ability to walk for a longer distance, and the ability to walk up and down stairs with greater ease), less disturbed sleep, and more positive emotions. These experiences are exemplified by the following quotes from the informants:

It helped me a lot… My legs are steadier when I walk, and I'm less clumsy. It's much better after the exercise movements. For example, at first, it was very difficult for me to walk up or down stairs… Very difficult… Now my knees are more… There's more strength when I bend my legs (Informant 2).

I'm less tired when I walk. At that time, I felt very uncomfortable when I was lying down. After the practice, I've gradually become able to sleep longer. There isn't much pain! (Informant 5).

The tendons and ligaments are more flexible. In the past, I wasn't able to reach so far. Now I can reach farther. My life is better, and I've a pastime. I'm happier (Informant 4).

Meeting expectations of the exercise programme

With all the above-mentioned positive experiences of the exercises' effects, all of the informants agreed that their expectations of the exercise programme were met, and they were willing to recommend the exercise programme to other older people. For example, one informant said:

Of course I hoped it'd help me. At least there's no pain when I walk. It's better after the course. There's less pain... I'd recommend it to others. I've made some progress. My progress is small probably because I'm lazy. Others will make more progress if they work harder (Informant 5).

Therefore, the informants mainly experienced various positive effects of the exercise movements. The various positive effects mentioned in the interviews included a reduction of knee pain and stiffness, and an increase in knee range-of-motion, leg strength, and knee stability, as well as an improvement in physical functioning, sleep, and emotional well-being. The informants were willing to recommend the exercise programme to other older people.

Integration of the Exercises into the Daily Routine

Integration of the exercises into the daily routine refers to the motivation of the informants to adhere to the exercises and the strategies used by them for integrating the exercises into their daily routine. The strategies used for integrating the exercises into the daily routine varied from one informant to another depending on their living context. Nevertheless, some commonalities in the integration of the exercises into the daily routine were identified from the interview data.

Motivation to adhere to the exercises

The informants' motivation to adhere to the exercises was influenced by their positive perceptions of exercise in general for maintaining physical independence as well as their positive experience in mastering the exercise skills and experiencing the exercises' effects. Together, these enhanced their commitment to continual practice of the exercises and integration of the exercises into their daily routine. This is exemplified by the following quote from one female informant:

Exercising is good. I'll adhere to this fully. You need to adhere to the practice fully if you want your legs to improve and become more comfortable. I'd rather exercise than take medicines.... I'm old, so I need to exercise. I look after myself, right? If I don't exercise, my condition will deteriorate, and that's not good. I'll certainly keep doing this. These seven movements aren't difficult, are they? And they're easy to remember. You should keep practising them. It makes me more comfortable. That's good. If I want good health, I have to do this, right? Now I'm old, and what I look for is good health, so that I don't need the young to look after me (Informant 1).

Strategies for integrating the exercise

The informants' living context varied from one informant to another and they also had a variety of living styles and preferences. For example, two informants who got up late in the morning opted to practise the exercises during the rest of the day and they would compensate for the missed practice. One female informant said:

I usually don't exercise in the morning. I do it in the afternoon and in the evening after dinner. Sometimes I sleep till late in the morning. Sometimes I've different things to do until it's late. That's how time is gone.... I never skip it. When I am busy all day, I'll do enough exercise in the evening. I always have to do it (Informant 3).

Nevertheless, the informants were willing to set aside some time for doing the exercises. For example, one male informant who was living with his family found it difficult to consistently carry out the exercises during the daytime. Thus, he arranged to practise the exercises in the morning and before bedtime.

> *I've problems in the daytime. Often my family members ask me out... Sometimes they want to go and have tea... I mean, it's not convenient to exercise if you live with your family. That's because space is limited. I usually exercise in the morning and evening when they are not crowding in the living room. I go to bed after exercising in the evening* (Informant 6).

One informant adhered to practising the exercises only once a day to fit in with her living style. She developed this as a habit and felt satisfied with doing the exercises only once a day. She said:

> *I'm actually very lazy. I usually don't do it in the morning. I only do it before going to bed. I sleep till late in the morning and then I attend classes. It takes the whole morning. In the afternoon, I go home and sleep, to be honest [laughter]. It's more*

convenient for me to exercise in the evening ... That's a habit. ... That's enough. I'm satisfied as long as I get some exercise [laughter] (Informant 5).

The exercise venues were individualized and flexible. Most of the informants did the exercises at the same venue every day. The exercise venues included an outdoor site, a public place within the building, and a room in the home. For example, one female informant chose to exercise on the balcony, which was a public area within her building. She said:

I do it on the balcony. The air is better there. There're rails that I can lean against for support when I need to exert strength... (Informant 3).

Another male informant practised the exercises at various places. He said:

I practise three movements at home after getting up in the morning. Then, I practise the other four movements when I'm up on the hill. There's shade under the trees there. I've a habit of going up the hill... In the evening, I also practise it after dinner [laughter] (Informant 4).

One informant sometimes carried out the exercises at the park in the afternoon and she also made it a social topic with her peers. She said:

Sometimes I go to the park, sit there and exercise. Sometimes people look at me, and I'd recommend them to do it. I'd recommend them to follow, to straighten or stretch their legs. It's quite comfortable. I'd ask them to try. The people would try to learn the exercise I'm doing... Sometimes I bring the leaflet with me, and people would ask me about it. They'd ask me whether I'd brought the leaflet. If I had, we'd practise the exercise... We do it for fun... at 3 pm or so. We do it for fun! (Informant 2).

However, it was interesting to note that all the informants found some time to practise the exercise movements when they were watching television programmes and most of them practised the exercises as a set in one go. One female informant reported that she had developed the habit of practising the exercises while she was watching television before going to bed. She said:

That's a habit. I exercise when I'm watching TV... [laughter] (Informant 5).

The informants found that the exercises could be practised while watching television and some of them expressed that it was more meaningful than just sitting there to watch the television programme. This is exemplified by the following quote from a male informant:

> *You can do it ... There was no problem ... All seven movements can be done when you're watching TV ... I do the exercises when I'm watching TV ... That's more meaningful than just sitting there and watching TV ... I practise the exercises ... I practise the seven movements in one go* (Informant 4).

In short, the informants were motivated to continue the exercises as they were confident in doing the exercises and they experienced the exercises' effects. In this connection, they were willing to set aside some time for doing the exercises twice or once a day. They adjusted the exercise time according to their living context. They also individualized the exercise venue to fit their preferences and daily routine. The exercises were flexible enough that they could do them at various exercise venues. They could make it a social topic with peers when they did it at the park. The commonalities among the informants were that they usually practised the exercises as a set in one go and they would integrate the exercise time into their time for watching television.

Summary of the Results

In summary, the final sample of the quantitative component of the Phase II study consisted of 33 participants. The health status of the participants on enrolment into the study was on average suboptimal, and they did experience the key symptoms of KOA. The participants were in general highly satisfied with the exercise programme. They were most satisfied with the teaching of the instructor but less satisfied with their ability to memorize the recommended exercises. The open-ended comments about the exercise programme were mainly positive. The overall level of adherence in terms of practising the exercise movements according to the recommended frequency of practice was high, although a few of the participants (N = 4) failed to attain a 75% adherence rate. The reason most frequently given for skipping exercise was 'went out', and the reason least frequently given was feeling 'depressed', while the other reasons, 'pain', 'tired', 'ill', 'busy', and 'forgot' were given by the informants with moderate and similar frequency. The participants' overall performance in mastering the exercise movements was good, although the performance varied among the participants. The best performed exercise was the knee range-of-motion exercise. The most poorly performed exercise was the exercise requiring the participants to stretch the back of knee.

Regarding the health outcome changes of the participants before and at three months after the exercise programme, most of the health outcomes significantly improved, except for that represented by the SF-12 physical health summary score, which demonstrated some improvement but could not attain a statistically significant level. Hence, the exercise programme may produce positive changes in health outcomes, including improvements in knee pain, knee stiffness, physical functioning of the knee (including knee range-of-motion and the muscle strength and endurance of the lower extremities), disease-specific health status, and general health status, particularly in the aspect of mental health.

In the qualitative component of the Phase II study, four major categories were identified from the interview data: (1) satisfaction with the exercise programme, (2) mastering of the exercise movements, (3) experience of the exercises' effects, and (4) integration of the exercises into the daily routine. Satisfaction with the exercise programme refers to the informants' general satisfaction with the content, class and venue arrangement, and teaching approach of the exercise programme. Mastering of the exercise movements refers to the ability of the participants to perform the exercises correctly. Return demonstration and correction of the exercise movements in class, as well as the assistance of the supplementary materials, were important for mastering of the exercise movements. Some informants might also require assistance from relatives. Experience of the exercises' effects refers to the informants' experience of the exercises' effects, including reduction of knee pain, improvement in knee flexibility, knee stability, leg strength, and physical functioning of the lower extremities, better sleep, and more positive emotions. Integration of the exercises into the daily routine refers to the motivation of the informants to adhere to the exercise programme and the strategies used by them for integrating the exercises into their daily routine. The main strategy was to set aside some time for doing the exercises and practising the exercises at venues in accordance with one's preference and lifestyle. Doing all seven exercise movements in one go and integrating the exercise time into the time for watching television programmes were strategies commonly used by the informants.

Although the informants did not point out areas for improvement of the exercise programme, some interview findings provided insights to improve the exercise programme. These findings were as follows: (1) two informants reported that two of the exercise movements were difficult; (2) one informant reported that she could not understand the information given without the question and answer session; (3) it was commented that it was sometimes difficult to maintain the focus of group sharing; (4) limitations of group teaching in catering for the variations in the learning abilities of the participants were noticed; and (5) there were no follow-up sessions apart from the post-test session and the participants might have made some mistakes in doing the exercises.

Therefore, the quantitative component of this Phase II study provided some preliminary quantitative information for understanding the participants' satisfaction with the exercise programme, the participants' adherence to the recommended frequency in practising the exercise movements, the participants' mastering of the exercise movements, and the effectiveness of the exercise programme. Regarding the qualitative component of this Phase II study, the four major categories identified from the interview data demonstrated consistency with the results obtained from the quantitative component and also supplemented the quantitative findings to improve comprehension of the effectiveness of the exercise programme in promoting continual practice of the exercises in older Chinese people with KOA in Hong Kong. These results will be discussed in the next section of this chapter.

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

(PHASE II STUDY)

Introduction

In view of the overall aim of the study, an exercise programme was developed and piloted to collect preliminary data for understanding its acceptability on promoting continual practice of exercise for KOA in older Chinese people with KOA in Hong Kong. The preliminary findings supported the participants' general satisfaction with the exercise programme and adherence to the programme. The findings from the pilot study also indicated an overall high level of mastery of the exercise movements. Moreover, the therapeutic value of the exercises was preliminary supported. The interview data on the participants' perceptions and experiences of participating in the exercise programme provided support and explanation for the quantitative findings. In addition, some areas for improvement of the exercise programme also emerged from the interview data. This section discusses the results of the Phase II study in the light of the literature. The characteristics of the participants are compared with the characteristics of the general older population and the older people with KOA in Hong Kong. The baseline findings of the participants' health outcomes are briefly discussed. The quantitative results of the Phase II study are discussed with respect to the study objectives. In addition, the qualitative findings are discussed with the pertinent quantitative results so as to enhance a comprehensive discussion of the participants' satisfaction with the exercise programme, their adherence to practising the exercise movements as recommended, their mastering of the exercise movements, and their changes in health outcomes. Moreover, limitations of the Phase II study are discussed. Lastly, implications and recommendations for nursing as well as recommendations for further research are suggested.

Discussion

There are limited exercise intervention studies in older Chinese people with KOA in Hong Kong. In addition, the role of clients' perceptions and experiences of exercise in developing exercise interventions for this client group has been neglected in previous studies (Campbell et al., 2001). The exercise programmes in previous studies are developed mainly from the healthcare professional's perspective. Although some of these exercise programmes mentioned assessments for prescription of exercise regimen, these assessments mainly focused on the client's neuro-musculoskeletal functions but ignored the client's perceptions and experiences of exercise. The approach in previous studies tends to ignore the partnership of the clients in the design of exercise programme. The exercise programme of this study, therefore, is different from those in previous studies it has been developed by considering the clients' perceptions and experiences of exercise in relation to their values, beliefs, and living context in the development process. For example, the way to deliver this exercise programme was arranged to meet the learning ability and style of the clients. In addition, mode, intensity, duration and frequency of the exercise regimen were designed to match the clients' exercise habits and concerns in exercising. In this Phase II study, this exercise programme was piloted in order to obtain preliminary information about its acceptability on a number of aspects including: the participants' satisfaction with the exercise programme, their adherence to the prescribed exercises and also their mastering of the exercises. In addition, the possible therapeutic value of the prescribed exercises was also identified. With regard to the positive results obtained from this pilot study, the role of clients' perceptions and experiences of exercise in developing exercise interventions for older people with KOA is preliminary supported. When compared with the results of previous exercise intervention studies in people with KOA, the tailor-made exercise programme in the Phase II study demonstrates an improvement in the participants' adherence to the prescribed exercises (Ettinger et al., 1997; Pisters et al., 2010; Tsang 2003). In addition, it also demonstrates a slightly better beneficial effect for reducing the participants' symptoms of KOA and improving their health status (Baker et al., 2001; Wong et al., 2005). Hence, exploring the clients' perceptions and experiences of exercise and using the information in the design of exercise interventions is a possible direction for exercise management of KOA so as to enhance the long-term beneficial effects of exercise among older Chinese people with KOA. In line with this direction, adopting a client-centred approach would be an important conceptual element for practitioners to consider in promoting continual practice of therapeutic exercise among this client group. The following sections will provide further discussion on the results of the Phase II study.

Characteristics of the Participants

The characteristics of the participants in the Phase II study are mainly similar to those of the general older population and the older people with KOA in Hong Kong. The majority of the participants in the Phase II study were female and this is consistent with the higher prevalence of KOA in women both locally and internationally (Felson, 2004, WHO, 2010b; Woo & Lau, 2001). The majority of the participants had a habit of exercising regularly and this finding is similar to that of the proportion of older people in Hong Kong (C&SD of HKSAR, 2008); hence, there is a culture of exercising among older people in Hong Kong. According to the literature, prior exercise behaviour is a predictor for exercise adherence (Rejeski et al., 1997). Therefore, the participants' habits of exercising are favourable to their adherence to the exercises for KOA. The majority of the participants (78.7%) were overweight or obese, which is higher than the 50-60% of older adults in Hong Kong who are overweight or obese (Woo, Leung, & Kwok, 2007). The explanation for this may be that obesity is a risk factor for KOA and thus more prevalent among the participants (Lau et al., 2000; Lau et al., 2007; Woo & Lau, 2001; Zhang & Jordan, 2008). Weight reduction, in fact, is a strategy for reducing the symptoms of KOA (Messier, 2010). Approximately two-fifths of the participants walked with aids in their daily living and this is consistent with the report of a local study (Woo et al., 1994); difficulty in walking is a common phenomenon as KOA progresses (Jeffreson & Hammond, 2002; Moskowitz et al., 2007; Walker, 2009). Comorbidity was common among the participants, and this is consistent with the observed phenomenon in the general older population as well as older people with knee pain in Hong Kong (C&SD of HKSAR, 2008; Woo et al., 2009).

However, the participants' marital status, educational level, and living arrangements had a slightly different distribution from that in the general older population in Hong Kong. Approximately 45% of the participants in the Phase II study were widowed and this is slightly higher than the 32% in the general older population in Hong Kong (C&SD of HKSAR, 2008). In older Chinese, widowhood could be related to less social support and increased vulnerability to depression; however, social support from adult children could buffer these deleterious effects (Li et al., 2005). It was found that approximately 91% of the participants did not attain a secondary educational level and this percentage is a little higher than the range of 75% to 78% in the general older population and the older people with knee pain in Hong Kong (C&SD of HKSAR, 2008; Woo et al., 2009). As discussed in Chapter 4, the lower educational level of the participants may be associated with the risk factor of occupational activities for KOA and it is also related to poorer knowledge of exercise (Hill & Bird, 2007; Hui & Morrow, 2001). Lastly, approximately one-third of the participants were living alone and this is higher than the 13% in the general older population in Hong Kong (C&SD of HKSAR, 2008). According to a cross-sectional data analysis to the Hong Kong Population Census conducted by Chou et al. (2006), living alone may result in higher levels of depressive symptoms for older women but not for older men while this relationship is modified by socio-demographic variables, health indicators, social support and financial strain. Hence, the participants in this study may prone to have less social support, higher vulnerability to depression and less knowledge of exercise but these are modifiable by their socio-demographic and clinical factors such as health indicators, social support and financial strain.

Baseline Findings of the Participants' Health Outcomes

With regard to the participants' health status in the baseline findings, the participants did experience knee pain, knee stiffness, and difficulties in physical functioning and these are the key symptoms of KOA (Moskowitz et al., 2007; Walker, 2009). The wide ranges of severity of these symptoms among the participants (the WOMAC pain subscale scores ranged from 0.42 to 86.25; the WOMAC stiffness subscale scores ranged from 0.00 to 84.38; and the WOMAC physical functioning subscale scores ranged from 0.68 to 89.00) indicated that the sample of the Phase II study consisted of participants with different severities of KOA, ranging from mild to severe (Hooper & Moskowitz, 2007; Portney & Watkins, 2009). According to the mean values of these symptoms (the WOMAC pain subscale score: mean = 35.16, SD = 23.59; the WOMAC stiffness subscale score: mean = 26.98, SD = 23.29; and the WOMAC physical functioning subscale score: mean = 35.12, SD = 24.32), the participants in general might experience more pain and difficulties in physical functioning than stiffness in the affected knee, and the knee pain was in general moderate. In addition, these mean values might indicate that the sample in the study was in general suffering from mild to moderate severity of KOA.

The participants' general health was suboptimal with mental health better than physical health (the SF-12 physical health summary score: mean = 30.41, SD = 17.07; and the SF-12 mental health summary score: mean = 47.21, SD = 12.89) in comparison with that of the general population in Hong Kong (mean = 50, SD = 10 for both the SF-12 physical and mental health summary scores) (Lam et al., 2005). This is in accordance with the findings of a local study on older Chinese people with KOA that reported an overall suboptimal general health of the subjects (the SF-36 physical health summary score: mean = 22.19, SD = 8.9; and the SF-36 mental health summary score: mean = 48.3, SD = 9.26) as measured by the SF-36 (Yiu, 2007). In addition, this study also found that the subjects' mental health was better than their physical health (Yiu, 2007). The literature has also reported that people with KOA are more likely to experience diminished vitality, worse perceived health, and poorer quality of life (Bookwala et al., 2003; Briggs et al., 1999; Jakobsson & Hallberg, 2002). In addition to these participants' reports, the participants also demonstrated decreased knee ROM and prolonged time for the TST. Hence, their knee flexibility and muscle strength of the lower extremities were below normal ranges (Berman et al., 2008; MacFarlane et al., 2006). These objective assessment findings are consistent with the participants' self-reports of physical functioning in the WOMAC. Moreover, older people with KOA are known to have compromised knee flexibility and lower extremity strength (Moskowitz et al., 2007; Walker, 2009).

Participants' Satisfaction with the Exercise Programme

The first objective of the Phase II study was to evaluate the participants' satisfaction with the exercise programme. This was evaluated by assessing the participants' comments on various aspects of the exercise programme and also on their learning and practising of the recommended exercises. If the participants are satisfied with the exercise programme, they are more likely to participate in the programme and practise the recommended exercises (Schoster, Callahan, Meier, Mielenz, & DiMartino, 2005). Overall, the participants demonstrated a high level of satisfaction with the exercise programme. The participants' overall satisfaction with the exercise programme was mainly consistent with the qualitative findings.

The participants appreciated the opportunity to learn a set of exercises for the knees. According to Damush et al. (2005), the appreciation of an organized exercise opportunity is associated with the motivation to join and maintain an exercise programme. Moreover, the participants' appreciation of the opportunity to learn the exercises may indicate an educational need to learn therapeutic exercises for KOA in this client group. As discussed earlier in this section, the educational level of the participants of this study in general was low and this has been reported in previous studies as a factor associated with a poor knowledge of exercise (Hill & Bird, 2007; Hui & Morrow, 2001).

The aspect with which the participants were most satisfied was the teaching of the instructor. The teaching of the instructor has been reported in previous studies as an important factor influencing the participants' satisfaction with and attendance of the exercise programme (Campbell et al., 2001; Schoster et al., 2005). In the qualitative findings, the participants expressed appreciation of the teaching style, including the lively and clear explanations and patience in teaching. In addition, they appreciated the teaching approach of live demonstration and return demonstration. This teaching style and approach have been mentioned in the literature as facilitators providing a sense of support to older people with KOA who are participating in an exercise class (Schoster et al., 2005). Moreover, in the study by Campbell et al. (2001), the relationship between the participants and the instructor has been identified as the main factor influencing class attendance and initial compliance with the exercise regimen. Therefore, the qualitative findings have further explained the particular satisfaction with the teaching of the instructor, and the importance of this aspect in influencing the participants' participation in the exercise programme is supported by previous studies.

The aspect with which the participants were least satisfied was their confidence in memorizing the recommended exercises. The lack of confidence in memorizing newly-learnt exercises was expressed by the older people with KOA in the Phase I study. Memory as a learning ability is related to exercise self-efficacy, which is an important factor influencing the participants' motivation to join and continue an exercise programme (Damush et al., 2005). Although confidence in memorizing the recommended exercises was the aspect with which the participants were least satisfied, there were only two participants whose ratings showed inadequate confidence. Hence, the majority of participants had built up the necessary confidence in memorizing the exercise movements. This positive finding may be related to the participants' perception of the simplicity and suitability of the exercise movements as reported in the qualitative findings. For example, one participant in the qualitative part of the study compared the learning of the exercises in this exercise programme with her previous experience of learning Tai Chi. She could not manage to learn Tai Chi and she forgot the movements after class; in contrast, she commented that the exercises in this exercise programme were simple enough that she could pick them up, so she was interested in these exercises. Hence, perceived simplicity of the exercise movements may promote exercise self-efficacy in older Chinese people with KOA, since exercise self-efficacy is a factor known to be positively associated with exercise adherence (Fitzgerald, 2005; Marks & Allegrante, 2005; Rhodes & Fiala, 2009).

The participants also demonstrated satisfaction with the class and venue arrangements. These arrangements were made after consideration of the concerns about learning exercises mentioned by the older Chinese people with KOA in the Phase I study. For example, two participants in the qualitative part of the Phase II study reported that they had changed class time once so that they managed full attendance. Time clashes with other activities, such as having a doctor's appointment, can be a barrier to attendance of and continual participation in an exercise programme (Campbell et al., 2001; Veron & Ross, 2008), although this may reflect the participants' priority setting for learning the exercise (Hendry et al., 2006). The results of this study showed that the use of multiple identical classes could reduce this barrier to class attendance. The class venue in this study was a community centre for older people within the participants' residential area, and the study results showed that this arrangement was well accepted by the participants. This arrangement was made after consideration of the concerns about the time, cost, and difficulties involved in transportation to exercise class venues that were mentioned by the older Chinese people with KOA of the Phase I study. Mobility limitations as a barrier for older people with KOA to participating in an exercise programme have also been mentioned in the literature (Baird, 2000; Kee, 1998; Maly & Krupa, 2007).

Moreover, the participants' satisfaction with the class venue may also be related to their relationships with the centre staff and members. These relationships are social supports which may motivate the participants to engage in the exercise programme (Damush et al., 2005; Hendry et al., 2006; Litt et al., 2002).

The participants also showed appreciation of group teaching. Various advantages of group teaching had been mentioned by the participants in the interviews. These advantages included social support among the participants, more fun in participating in the exercise programme, and less stress in performing the exercises in class. Group teaching had been mentioned by the older Chinese people with KOA in the Phase I study as a preferred learning method. Fransen & McConnell (2009) concluded that there was no significant difference in the effectiveness in improving the health outcomes of KOA between individual and group delivery of an exercise programme. However, previous studies have shown that exercise in class can promote exercise class attendance and exercise adherence (Damush et al., 2005; Hendry et al., 2006; Schoster et al., 2005; Litt et al., 2002). Schoster et al. (2005) also reported that group teaching could challenge the participants to move their bodies in ways that they may not have if they had been exercising on their own. Nevertheless, as suggested by the qualitative findings, group teaching may have limitations in catering for participants with various learning abilities. The group size of 8 to 10 participants per group in the exercise programme has been supported by the literature as being effective for delivery of client education (Ooi et al., 2007). Reducing the group size may adversely affect the dynamics and social support among the participants and the cost of running the exercise programme. Another way to deal with this limitation may be to consider allocating participants to different groups according to their learning abilities.

Other hints for improving the exercise programme emerged from the qualitative findings. Two muscle-strengthening exercise movements were separately identified by the participants as difficult to do. As quadriceps muscle atrophy and weakness are prevalent in older people with KOA (Bennell et al., 2008; Fink et al., 2007; Ikeda et al., 2005; Slemenda et al., 1997; Slemenda et al., 1998), it is not surprising that the participants found these exercises difficult. Future adaptation of the exercise programme may include a longer adaptation period for the muscle-strengthening exercises.

In addition, some improvement may be required for the sharing session. It was interesting to find that the majority of participants in the qualitative part of the Phase II study considered the sharing session a time to chat. One male participant commented that the sharing session had often gone off track. Nevertheless, the participants did demonstrate their own ways of integrating the exercise into their daily routine. The question then arises as to what extent it is necessary to maintain the focus of the sharing session on integrating the exercises into the daily routine. In a previous exercise intervention study in arthritis patients, it was found that the participants valued being able to interact with others who lived with arthritis and considered it to be an opportunity to share other practical information (Schoster et al., 2005). Thus, from the participants' perspective, the topic of the sharing session might not necessarily be restricted to exercising. While social support in class has been perceived as a motivator for participating in an exercise class (Schoster et al., 2005), restricting the topics in the sharing session may adversely affect the social support. Moreover, as the participants were living in the same residential district, sharing on how to integrate the exercises into the daily routine could happen outside the class time.

Participants' Adherence to Practising the Exercise Movements

The second objective of the Phase II study was to examine the participants' adherence in practising the exercise movements according to the recommended frequency. The participants demonstrated an overall high level of adherence to the recommended frequency of exercise practice (mean percentage = 91.3%, SD = 14.54). In addition, 29 (87.8%) participants attained a level of adherence higher than

75% and more than half (N = 17, 51.5%) of the participants adhered fully to the recommended frequency of exercise practice. This adherence rate is high in comparison with the average percentage of exercise adherence at a range from 30.1% to 86% reported by previous studies, and the adherence rates at three months reported by previous studies (Ettinger et al., 1997; Pisters et al., 2010; Tsang 2003). For example, in the studies by Ettinger et al. (1997) and Pisters et al. (2010), the adherence rates at three months (which was the end of the exercise programme in both cases) were 85% and 57.8%, respectively. Hence, the exercise adherence rate in this Phase II study was higher than the adherence rates in the previous studies despite the fact that there was a three-month period without follow-up sessions for the participants in the Phase II study.

The average adherence rates to individual exercise movements did not vary a great deal. They all fell within the range of 89.2% to 92.2%. Therefore, there was not one particular exercise movement that was practised significantly more or less than the others. These detailed analyses of exercise adherence were not reported in previous studies, thus making comparisons of findings unfeasible. However, inconsistency between the participants' mastering of the exercise movements and their adherence to the exercise movements according to the recommended frequency was observed in this Phase II study. Although the participants had practised all the exercise movements quite equally in terms of the recommended frequency, they might not master all the exercise movements equally well. Hence, exercise adherence and mastering of exercise are different aspects influencing the exercise effect.

The most common reason given for skipping exercise was ‘went out’ and the least common reason was ‘depressed’. The high frequency of choosing ‘went out’ as a reason for skipping exercise echoed the findings of the Phase I study, in which the participants showed concerns about time clashes with other activities in learning exercises for KOA. The time demanded for participating in exercise activities is one of the most frequently cited barriers to exercise adherence (Campbell et al., 2001; Rhodes & Fiala, 2009; Veron & Ross, 2008). Since the average exercise adherence rate in this Phase II study was so high, the time demanded for exercise was obviously not a significant barrier. The low frequency of choosing ‘depressed’ as a reason for skipping exercise concurs with the findings in regard to the mental aspect of the general health status among the participants. The participants’ mean SF-12 mental health summary scores at baseline and three months after the exercise programme were 47.21 (SD = 12.89) and 54.46 (SD = 11.63), respectively; this is comparable to the mental health summary scores of the general population of Hong Kong (mean = 50; SD = 10; Lam et al., 1999). In addition, older Chinese adults in their culture may not be used to explaining their health behaviour in psychological terms (Mak & Chen, 2010). Instead they are reported to have a greater likelihood to present their psychological problems as physical/somatic complaints (Mak & Chen, 2010). Some researchers have tried to explain this phenomenon of somatisation among Chinese. They argue that Chinese tend to suppress their negative emotions in order to preserve 'face' and harmony in social interactions (Mak & Chen, 2010). 'Face' represents social perceptions of a person's prestige and a loss of 'face' would result in a loss of trust within a social network (Yang, et al., 2007). 'Depressed' has been perceived by Chinese as a character problem that may worsen interpersonal relationships (Lee, 1999). Therefore, Chinese people may not be willing to disclose depressed mood to others. Instead they may express their negative emotions by using physical/somatic complaints which are perceived as more acceptable in the Chinese society.

The qualitative findings showed that exercise adherence among the participants were influenced by a number of factors. They were the participants' positive perceptions of exercise for health maintenance and desire to maintain independence in self-care, as well as their positive experiences in mastering the exercise movements and experiencing the exercises' effects. Hence, multiple factors are involved in sustaining exercise adherence among the participants. Previous literature has supported the notion that positive perceptions of exercise for health maintenance and the strong desire to be independent are associated with exercise adherence (Campbell et al., 2001; Gecht et al., 1996; Hendry et al., 2006; Kee, 1998; Victor et al., 2004; Wallace & Lahti, 2005). Positive experiences in mastering the exercise movements are related to a higher self-efficacy in exercise, thus enhancing exercise adherence (Damush et al., 2005; Marks & Allegrante, 2005; Rhodes & Fiala, 2009; Shin et al., 2006). In addition, there is strong evidence for the relationship between the experience of the exercise's effect and exercise adherence in the literature (Campbell et al., 2001; Damush et al., 2005; Hendry et al., 2006; Kee, 1998; Minor & Brown, 1993; Thorstensson et al., 2006).

The qualitative findings also demonstrated that the participants' integration of the exercises into their daily routine was individualized according to their lifestyles and preferences. The key elements for the integration of exercises into the participants' daily routine might be related to their willingness to set aside some time for doing the exercises and also the ease with which the exercises can be carried out at different exercise venues. Although the findings of the Phase I study showed a typical living pattern with KOA, the findings of this Phase II study revealed that there was still a variety of lifestyles and preferences among older Chinese people with KOA. The participants' willingness to set aside some time for doing the exercises hinted at the priority they gave to the exercises (Hendry et al., 2006). According to Minor & Brown (1993), anxiety is negatively associated with self-directed exercise at three months. The participants' commitment to making time for the exercises may be related to their building up of confidence in mastering the exercise movements, and this will be further discussed in this discussion section. In addition, the ease with which the exercises can be adapted for different contexts might facilitate the participants' integration of the exercises into their different lifestyles and preferences for exercise venues (Marks & Allegrante, 2005). For instance, one participant described how he practised the exercises at home and also up on a hill to fit the exercises into his daily exercise routine.

It was interesting to note that the time for watching television was commonly used by the participants for doing the seven exercise movements. For example, one of the participants reported that she had developed the habit of practising the exercises while she was watching television before going to bed. Watching television is a very common leisure activity among the public in Hong Kong, and the participants in this Phase II study demonstrated that it is feasible to carry out the exercises while watching television. Hence, the exercise prescription was successful in the sense that it can be integrated into the common daily routine of the older Chinese people with KOA in Hong Kong.

Participants' Mastering of the Exercise Movements

The third objective of the Phase II study was to assess the participants' mastering of the exercise movements. The participants' return demonstration performance scores (which ranged from 28.57 to 100) indicated a wide range of performance, although the majority of participants (57.5%) attained a score higher than 75. A few participants performed quite poorly, while four participants (12.1%) obtained a full score (i.e., 100). The average performance of the participants in this study was good, with a mean score of 76.71 (SD = 21.75). Two previous studies assessed the correctness of exercise performed by the participants (Schoo et al., 2005a; Tsang, 2003). The study of Tsang (2003) was conducted in a group of frail older Chinese people with KOA in Hong Kong; Tsang (2003) reported that only 10.53% of the participants could perform all the exercise skills correctly. In comparison with the results obtained in the study of Tsang (2003), the percentage of participants who performed all the exercises correctly in this study is slightly higher than that in Tsang's (2003) study. However, Tsang (2003) did not report the criteria of assessment; further comparisons of the results between the two studies are difficult. Another previous study which reported the participants' performance in mastering the exercise skills was carried out by Schoo et al. (2005a). They found that an average of 79% of the exercises were performed correctly by the older people with hip or knee OA at week 8 immediately after the exercise programme (Schoo et al., 2005a). The result of this study on mastering of exercise skills (76.71%) is comparable with the result (79%) obtained in the study of Schoo et al. (2005a). However, there was a difference between the study of Schoo et al. (2005a) and this Phase II study in the timing of the assessment of the participants' performance. Schoo et al. (2005a) conducted the assessment immediately after the exercise programme, while this study conducted the assessment at three months after the exercise programme. In addition, the scoring system used by Schoo et al. (2005a) was different from that used in this study. In the study of Schoo et al. (2005a), participants who performed an exercise incorrectly were given '0', whereas '1' was awarded when the exercise was performed correctly. Their scoring system is crude and the judgement was just a decision between correct and incorrect performance. The advantage of using a crude scoring system is that it will likely yield a higher inter-observer agreement when the study used more than one assessor (Portney & Watkins, 2009). However, a crude scoring system will fail to know to what extent the exercise is performed incorrectly. Nevertheless, previous studies of exercise adherence in older people with OA seldom assess the participants' exercise performance. There are only two previous studies which reported assessments of the participants' performance. However, it is important to identify the participants' performance as exercise adherence may not necessarily correspond to benefits of the exercise because incorrect performance of exercise may cause harm rather than benefit to the body (Schoo et al., 2005a).

Of the seven exercise movements, it was found that the exercise which required the participants to stretch the back of knee was the most poorly performed. This exercise movement was the most complicated one among the seven exercise movements as it required more coordination of different muscle groups and also holding of the position for 10 seconds. This may explain why the majority of participants could not perform it correctly. Previous studies which had included stretching the back of knee in their exercise interventions had not reported the exercise performance of the participants (Fransen et al., 2001; Wong et al., 2005). However, as in this study, they showed a significant improvement in the symptoms of KOA among the participants in their studies. With such a poor performance of this exercise, future adaptation of the exercise programme may include an alternative method to stretch the back of knee or more monitoring of the performance of this exercise.

The qualitative findings supplemented the quantitative findings and provided more information about the process of the participants' mastering of the exercise movements. A few elements emerged as important for the participants' mastering of the exercise movements. They were return demonstration and correction of exercise movements in class, the assistance of supplementary materials at home, and corrections at follow-up sessions.

The participants found the return demonstration and correction of exercise movements in class useful for their learning of the exercises. These are the main features of small-group supervised exercise programmes that have been supported by the literature for enhancing the participants' mastering of the exercise skills thus improving their health outcomes in KOA (McCarthy et al., 2004). The participants' appreciation of these teaching approaches has been reported in a study by Schoster et al. (2005), in which they commented that these teaching approaches made it much easier to learn the exercises. The use of return demonstration and corrections for teaching exercise movements can alleviate the participants' anxiety about doing something wrong (Thorstensson et al., 2006). In addition, the learners considered these teaching approaches to be supportive (Schoster et al., 2005); thus, the participants may be more motivated to learn and therefore quicker to master the exercises.

The participants reported that they required the assistance of the leaflet and poster for reviewing the exercise movements at home at the beginning of the course.

Provision of supplementary materials is important for the participants' mastering of the exercise movements (Schoster et al., 2005). It is interesting to note that there are no significant differences between various types of supplementary materials such as brochures, audiotapes, and videotapes in augmenting exercise interventions (Schoo et al., 2005a). One previous study found that verbal instructions with a written follow-up were enough to augment the effect of an exercise intervention (Schneiders, Zusman, & Singer, 1998). Although written materials are probably useful for participants to master the exercise movements, the design and format, such as font size and use of illustrations, and the level of reading skills needed to understand the information can influence their effectiveness (Austin, Matlack, Dunn, Kesler, & Brown, 1995; Schoo, 2002). The majority of participants in the Phase II study did not raise concerns about using the leaflet or poster, hence the clarity of these written materials to the participants is assumed. Thus, they found that these written materials could assist their mastering of the exercise movements.

With regard to corrections at follow-up sessions, the design of the exercise programme primarily did not have follow-up sessions. The post-test session at three months after the exercise programme was considered as a follow-up session by the participants as it consisted of return-demonstration and correction of the exercise movements. The participants of the qualitative part of the Phase II study showed appreciation of the return-demonstration session and corrections made. This finding suggests the need to design follow-up sessions for the exercise programme to enhance the participants' mastering of the exercise movements. Follow-up of the participants is likely to enhance the participants' confidence in practising the exercise and has been recognized as a strategy for increasing exercise adherence (Marks & Allegrante, 2005).

Changes in the Participants' Health Outcomes

The last objective of the Phase II study was to investigate the therapeutic value of the exercises by assessing the participants' health outcomes before and at three months after the exercise programme. The exercises prescribed to the participants included two knee range-of-motion exercises, two stretching exercises, and three quadriceps muscle-strengthening exercises. The two knee range-of-motion exercises and the two stretching exercises were prescribed for nurturing and enhancing flexibility of the knees (O'Grady et al., 2000). The three quadriceps muscle-strengthening exercises included one isotonic exercise using an exercise band as the resistant and two closed chain exercises corresponding to daily functional activities were prescribed for improving the strength and endurance of the quadriceps muscles, and the knee stability and function (Baker & McAlindon, 2000;

Ehrman et al., 2010; O'Grady et al., 2000). On the whole, the seven exercise movements were prescribed for reducing knee pain, stiffness and difficulties in physical functioning (Baker & McAlindon, 2000; Ehrman et al., 2010; O'Grady et al., 2000). Hence, the exercise movements were prescribed to improve the disease-specific health of the participants. In addition, the therapeutic effect of the exercises might extend to improve the general health in relation to the improvement in disease-specific health. Preliminary findings demonstrated multiple beneficial effects of the exercises on the participants' knee pain and stiffness, physical functioning, and disease-specific and general health. Hence, the therapeutic value of the exercises in improving the health outcomes of the participants is preliminarily supported.

The comparisons of the participants' knee pain, knee stiffness, and difficulties in physical functioning before and at three months after the exercise programme revealed that all of these key symptoms of KOA were significantly changed, with reduced knee pain (43.2%, $p < 0.0005$), less knee stiffness (43.5%, $p = 0.001$), and decreased difficulties in physical functioning (50%, $p < 0.0005$). In addition, the participants' disease-specific health status, as measured by the WOMAC, was significantly improved (45.9%, $p < 0.0005$) at three months after the exercise programme. The improvements in these self-reported symptoms of KOA are in general slightly better than the results in previous exercise intervention studies. For example, in a local study carried out by Wong et al. (2005), the improvements of knee pain, knee stiffness, and difficulties in physical functioning in a group of older Chinese people with KOA in Hong Kong for a period of 12 weeks were 44%, 37%, and 38%, respectively, as measured by the WOMAC. Moreover, in the study of Baker et al. (2001), the improvements of knee pain and physical function in a group of non-Chinese older people with KOA for a four months home-based progressive strength training programme were 36% and 38%, respectively, as measured by the WOMAC. Hence, the therapeutic value of the exercises is supported by the participants' self-reports on the symptoms of KOA; the effectiveness of the exercises in terms of reducing the participants' symptoms of KOA is slightly better than the effectiveness demonstrated in previous studies of exercise interventions in older people with KOA.

Moreover, with respect to the objective assessment of the participants' physical functioning, the results also demonstrated significant improvements at three months after the exercise programme, including an increased knee ROM (13.5%, $p < 0.0005$) and a decrease in the time required for performing the TST (15.8%, $p = 0.006$). Regarding knee ROM, Wong et al. (2005) could not obtain a significant change in their study. In addition to the difference in exercise prescription between the study of Wong et al. (2005) and the present study, the inconsistent results might attribute to the baseline knee ROM (mean = 120 degree) of the participants in the study of Wong et al. (2005). With reference to the normal knee ROM that is 120 to 130 degree, the majority of participants in the study of Wong et al. (2005) might have a normal knee ROM thus limited the possible improvements in this physical symptom in KOA. The participants' improvement in muscle strength and endurance as reflected by the significant findings in the TST is comparable to the findings in previous studies of the non-Chinese participants. For instance, Mangione et al. (1999) found an average of 18% improvement in the TST in older people with KOA after a 10-week stationary cycling exercise. However, Tsang (2003) could not find a significant improvement in a similar physical functioning test 'Chair Rise' in his study that he tested the effectiveness of a home-based exercise intervention in a group of frail older Chinese people with KOA in Hong Kong. The insignificant finding in the study of Tsang (2003) could be related to the participants' poor mastering of the exercise skills and the low intensity of exercise prescription. As reported by Tsang (2003), only 10.53% of the participants could perform all the exercise skills correctly. In addition, the exercise prescribed to the participants were mainly knee range-of-motion and low intensity isometric exercises, except the one which was an open chain isotonic exercise that the participant performed the exercise by raising their legs to against the earth gravity for 6 to 10 seconds. Therefore, the quadriceps muscles might not have been adequately overloaded to obtain an improvement in the 'Chair Rise' performance.

In summary, both the subjective and objective findings supported the therapeutic value of the exercises in the exercise programme for KOA. The therapeutic value of these exercises has been suggested in the literature (Baker et al., 2001; Deyle et al., 2000; Evcik & Sonel, 2002; Fransen et al., 2001; Hughes et al., 2004; Messier et al., 2000; Shakoor et al., 2008; Wong et al., 2005;), while the significant findings in this Phase II study provide further evidence of their effectiveness for KOA.

Furthermore, the interview data also supported the effectiveness of the exercises in the programme. The participants' experience of the exercises' effects emerged from the interview data. The participants described their experience of reduction in knee pain and stiffness, and also improvement in knee ROM and stability, leg strength, and physical functioning in the course of practising the exercises. These experiences of the exercises' effects are important for the participants to connect the knowledge they had learnt in the exercise programme to their own experiences of exercise (Thorstensson et al., 2006). In addition, such connections reinforced their beliefs about the importance of engaging in therapeutic exercise for KOA and thus enhanced their exercise adherence (Thorstensson et al., 2006).

It is important that exercise interventions address the key symptoms of KOA such as knee pain and difficulties in physical functioning. As mentioned in the literature, the knee pain of KOA dominates the clients' daily living (Baird, 2000; Maly & Krupa, 2007). Difficulties in physical functioning are strongly related to the clients' activities of daily living, such as walking, climbing stairs, rising up from a sitting position, using a toilet, getting in and out of a bathtub, and putting on and taking off socks (Jeffreson & Hammond, 2002; Moskowitz et al., 2007; Walker, 2009). Moreover, lower extremities impairment is a known risk factor for disability and institutionalization (Dunlop, Hughes, & Manheim, 1997; Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995; Woo et al., 1998), and older Chinese people tend to put a high value on living with family (Fung & Cheng, 2010). Therefore, the effectiveness of the exercises in reducing knee pain and improving physical functioning of the lower extremities among the participants has addressed the primary purpose of exercise intervention for this group of clients.

With regard to the effect of the exercises in improving the general health of the participants, the participants demonstrated a significant improvement (16.3%, $p = 0.002$) in the mental aspect of their general health. However, the improvement in the physical aspect did not reach a significant level ($p = 0.085$), although some improvement was noted in the comparison of the means between the pre-test (the SF-12 physical health summary score pre-test: mean = 30.41, SD = 17.07) and the post-test (the SF-12 physical health summary score post-test: mean = 36.36, SD = 16.10) scores. With regard to the qualitative findings, in addition to the improvement in knee pain and physical functioning, improvements in sleep quality and emotions were also reported by some of the participants in the interviews. Some previous studies of exercise interventions for people with KOA have also included an outcome measure of the participants' general health status. These studies mainly used the SF-12 or the SF-36 as the assessment tool, and their results were inconsistent (Bennell et al., 2005; Chaipinyo & Karoonsupcharoen, 2009; Fransen et al., 2001; Jenkinson et al., 2009; Tsang, 2003; Wong et al., 2005; Thomas et al., 2002). For example, similar to this study, Foley et al. (2003) noted a significant improvement in the SF-12 mental health summary score but not in the SF-12 physical health summary score. In the study of Wong et al. (2005), they could only find statistically significant improvements in two of the eight domains of the SF-36 (the SF-36 physical functioning and bodily pain subscale scores). On the contrary, Thomas et al. (2002) could not find a significant improvement in the SF-36 score. The inconsistent results in general health status may be related to the presence of comorbidity conditions among the people with KOA (van Dijk et al., 2008). When KOA is just one of the clients' health problems, the improvement in KOA may not be sufficient to change their perceptions of their general health status. For those without any comorbidity condition, the improvement in KOA may positively influence their perceptions of their general health status.

Limitations of the Study

This study has some limitations. First, the evaluation of exercise adherence was limited to three months after the exercise programme and thus the effectiveness of the exercise programme for promoting continual practice of the exercises is still inconclusive. Second, although the findings have demonstrated multiple beneficial effects of the exercises, it is impossible to isolate the different components of the exercise programme and attribute the changes in the participants' health outcomes solely to the exercise movements. Third, the one-group study design, small sample size, and single study site are methodological limitations for understanding the therapeutic effects of the exercise programme on changing the participants' health outcomes. In addition, as participant recruitment and the exercise class were carried out at a community centre for older people, the sample of this Phase II study may be biased towards older Chinese people with KOA who are more socially active and willing to participate in group activities. Moreover, the sample of this Phase II study was limited because the characteristics of being widowed, having little education, and living alone were more common among the participants than in the general older population in Hong Kong.

Summary of the Discussion

In summary, the positive results of the Phase II study provided preliminary support to the importance of acknowledging the role of clients' perceptions and experiences of exercise in the development of an exercise programme for promoting continual practice of therapeutic exercises in older Chinese people with KOA.

The participants of the Phase II study have similar characteristics to the older people with KOA in Hong Kong. They demonstrated the key symptoms of KOA, and the severity of their KOA ranged from mild to severe, with most of them suffering from moderate knee pain and difficulties in physical functioning. The participants were slightly different from the general older population in Hong Kong. Their average general health status was poorer, and the characteristics of being widowed, living alone, and having little education were more common among the participants than in the general older population in Hong Kong.

The participants demonstrated a high degree of satisfaction with the exercise programme. The quantitative findings in this regard were mainly supported by the qualitative findings. The aspect with which the participants were most satisfied was the teaching of the instructor, and this has been discussed in the literature as an important aspect of an exercise class that serves to provide a sense of support to the participants and influence their class attendance and initial exercise adherence. The majority of participants had the necessary confidence in memorizing the exercise movements by the end of the exercise programme. This participant response may be related to their perceptions of the simplicity and suitability of the exercises. The participants also showed satisfaction with other aspects of the exercise programme, including the opportunity for learning the exercises, the class and venue arrangements, and also the group teaching approach. Some areas for improvement in the exercise programme were also discussed.

The participants' exercise adherence was in general very high in comparison with the findings in previous studies. There was little variation among the adherence rates to the seven exercise movements despite the fact that some of the exercises were better mastered than the others by the participants. The most common and least common reasons for skipping exercises among the participants were discussed with the other findings of the study and also with the related literature. The participants' high level of adherence to the exercises was influenced by a number of factors, including positive perceptions of exercise and a strong desire to be independent in self-care, exercise self-efficacy, and experience of the exercises' effects on KOA. These factors are mostly identified and discussed in the literature in relation to exercise adherence. The participants' integration of the exercises into their daily routine was evidenced in the qualitative findings. They were willing to set aside some time for doing the exercises. In addition, the exercises were suitable for various exercise venues and this facilitated the integration of the exercises into the participants' lifestyles and preferences. It was common for the participants to carry out the exercises while they were watching television. This finding has not been reported in previous studies.

The participants' mastering of the exercises was widely varied. The average performance was good in return demonstration of the exercises. This finding has been compared with two previous studies which had a different timing and method for assessing the participants' performance. A small number of studies have assessed return demonstration of exercises in older people with hip or knee OA. The most poorly performed exercise was an exercise for stretching the back of knee, and this exercise was identified as the most difficult exercise in terms of requiring complex coordination of muscle groups and holding of the position for a relatively long time, which may be the reason for the participants' poor performance. With regard to the process of mastering the exercise movements, previous studies support the notion that return demonstration and correction of exercise movements in class may reduce the participants' anxiety and speed up the mastering process. The use of written materials to assist the mastering process also concurs with the findings in previous studies. However, the design of follow-up sessions may be added to the exercise programme to enhance correct mastering of the exercises.

The therapeutic value of the exercises has been demonstrated in the participants' health changes before and at three months after the exercise programme, and also in the qualitative findings, in their reports of experiencing the exercises' effects. The significant findings on improving the condition of KOA among the participants are slightly better than the findings in previous studies. The therapeutic value of the exercises in improving the participants' general health status was significant in the mental aspect but not in the physical aspect. This non-significant finding may be related to the impact of comorbidity on the physical health of the participants.

Some study limitations have been discussed. The evaluation of the participants' exercise adherence is limited to only three months. In addition, it is difficult to isolate the effects of the exercises from those of the exercise programme. Lastly, the limitations related to the design, sample size, and characteristics of the study may limit the generalizability of the findings.

Implications and Recommendations

According to the discussion of the results of the Phase II study, implications for nursing are identified. In addition, recommendations for nursing and future studies are suggested.

Implications and Recommendations for Nursing

Traditionally, exercise programmes are designed mainly with the expert inputs from healthcare professionals. However, poor exercise adherence or decrease of exercise adherence over time is observed in previous research of these exercise programmes. The findings of a qualitative study about exercise adherence among people with KOA indicated the need to consider clients' perceptions and experiences of exercise in the development of exercise programme in order to enhance continual practice of therapeutic exercises in this client group. The client as an important partner in treatment adherence has also been well discussed in the recent literature (Bissonnette, 2008; Bosworth, Oddone, & Weinberger, 2006; Carr, 2001). In the light of this direction, the current study was conducted and provided useful insights in the strategies needed to improve the long-term effectiveness of exercise interventions in older Chinese people with KOA.

The qualitative findings in the Phase I study revealed the clients' typical living pattern with KOA, strategies for managing KOA, experiences of exercise, values and beliefs about exercise and preference in learning exercise and these findings were considered in the development of the exercise programme in order to reduce the clients' barriers in learning and maintaining therapeutic exercises. The newly-developed exercise programme was developed and piloted in this Phase II study. With regard to the positive findings in this pilot study, assessments for the clients' perceptions and experiences of exercise, therefore, are suggested to be carried out before the design of an exercise programme. The assessment findings will inform nurses the educational needs of the clients and the strategies to enhance continual practice of therapeutic exercises among the clients.

Nurses have been health educators in various areas of specialty (Berman et al., 2008). Therefore, it is important for nurses to assess their clients' perceptions and experiences of the nursing topic so that they can identify their clients' barriers and facilitators in regard to adhering to the treatment regimen. Nurses can use the assessment data to tailor-make or adjust the treatment regimen so as to assist the clients to adhere to the regimen.

Collaborations with professionals from the related disciplines were found important during the process of developing the exercise programme. Various experts including a medical officer, a traditional Chinese Medicine practitioner, a sports scientist, physiotherapists, social workers and a community nurse had contributed to provide comments on the content and materials of the developing exercise programme. The contributions from various experts could improve the comprehensiveness and appropriateness of the exercise programme because different points of views related to caring of older people with KOA were considered in the development process. Most of the previous exercise intervention studies have not reported the development process of the exercise programme. With regard to the experience obtained in this study, a multidisciplinary approach is recommended for the development of an exercise programme.

The older Chinese people with KOA demonstrated a lack of exercise knowledge and skills, and they showed appreciation for the opportunity to learn the exercises for KOA. In Hong Kong, older adults are mainly poorly educated, with approximately 75% of them having a primary or below primary educational level (C&SD of HKSAR, 2008). The literature suggests that there is a positive association between educational level and exercise knowledge (Hill & Bird, 2007; Hui & Morrow, 2001), and the results of this study provide support for this relationship. Therefore, nurses as health educators should assist older people with KOA to acquire the necessary knowledge and skills related to exercises for KOA, such as differentiating between the different types of exercises and their effects on health and KOA, and learning the skills of flexibility and muscle-strengthening exercises for KOA. Although this study was carried out in a community centre for older people, a similar exercise programme could be carried out in other settings such as outpatient departments and homes for older people. In addition, nurses may consider integrating this exercise programme into the existing service of the orthopaedic outpatient department, home-help service to older people with KOA, or the service in the community centres for older people. Nevertheless, integrating this exercise programme into various health care services may be decided after having more empirical evidence supporting the effectiveness of this exercise programme for older Chinese people with KOA.

The qualitative findings revealed that the exercises could be carried out at different exercise venues and during the time of watching television. Therefore, the participants were facilitated to adhere to the exercises. These study findings imply the importance of reducing the implementation barriers such as venue and time limitations in exercise prescriptions so as to promote exercise adherence. Exercise prescriptions for clients with other chronic illnesses may also take these findings as a reference.

Time has been suggested as the most common barrier to engagement in exercise activities (Rhodes & Fiala, 2009), and Hong Kong is well known as a busy place. The results in this study support the suggestion that the use of multiple identical classes and a nearby venue for conducting exercise programmes in order to enhance the clients' attendance rate. Therefore, nurses may consider similar class and venue arrangements in other exercise programmes or health education sessions in order to facilitate the clients' class attendance and participation in treatment regimens in Hong Kong.

The results in this study also demonstrate that nurses can take up the role of an exercise instructor in the community setting. However, the input with regard to exercise teaching is minimal in the existing nursing curriculum. This may be related to the perceptions that it is an expert area of physiotherapists. However, nurses have been case managers of clients in the community setting. In addition, the Hong Kong Hospital Authority has been expanding the career of nursing and launched a number of nurse consultant positions in 2009 (Hospital Authority of Hong Kong, 2009). Nurses in the higher ranks of the hierarchy may be expected to independently manage chronically ill clients (Tsang, 2003). There may be plenty of opportunities for nurses to teach exercise knowledge and skills to clients with various chronic diseases. Nurse educators may consider strengthening the nursing curriculum to equip future nurses with more knowledge and skills for teaching exercise.

Recommendations for Further Research

The results of this pilot study have provided preliminary evidence to support the acceptability of the newly-developed exercise programme in promoting their continual practice of the recommended exercises for KOA and the possible therapeutic value of the exercise programme. Therefore, the next step is to test this exercise programme using a more rigorous research design in a larger representative sample (Medical Research Council, 2008). The exercise programme may be tested by using a multi-site assessor-blinded randomized controlled trial (RCT) with an adequate and representative sample (Portney & Watkins, 2009). The sample should be recruited from different settings, such as outpatient departments, home-help services, and community centres for older people, and different locations, such as different living districts in Hong Kong, so as to increase the generalizability of the findings (Portney & Watkins, 2009). In addition, the areas for improvement identified in this study should be used to revise the exercise programme before it is tested in a larger scale RCT. For example, the clients could be allocated into different groups according to their learning abilities. In addition, a longer adaptation period for the muscle-strengthening exercises could be designed. Moreover, some follow-up sessions could be scheduled to assist the clients to build up confidence and skills for correct implementation of the exercises. Lastly, the instructor could make better use of the sharing session as an opportunity for social support among the participants and encourage continued sharing of the participants' experiences of exercise outside class time.

In addition, the three months follow up period in this study has limitations to the understanding of the long-term effect of the exercise programme. Future studies should consider a longer follow up period such as 5 years (Pisters et al., 2010) in order to have a better understanding of the long-term effectiveness of the exercise intervention and also the process of exercise adherence. With regard to the effect of the exercises, multiple time-points of measurement are suggested to explore the pattern and potential of the exercises in improving the health among older people with KOA.

Moreover, very few studies of exercise adherence in older adults with KOA have assessed the clients' mastery of the exercises. However, incorrect exercise skills may adversely influence the exercise's effects and may do harm to the client (Ehrman et al., 2010; Schoo et al., 2005a). The relationship between exercise adherence in terms of frequency of practice and long-term exercise effects may be confounded by the clients' poor mastery of the exercises. Therefore, future research on exercise adherence is recommended to include the assessment of the clients' performance of the exercises as an indicator of exercise adherence. Moreover, future research may also develop a standardized evaluation system and assessment methods for return-demonstration of exercises, so as to enhance comparisons of research findings in this aspect between studies.

Furthermore, a component of cost-effectiveness analysis is recommended for further evaluations of the exercise programme. Health care costs of medical and surgical treatments for people with KOA have been reported in a local study (Woo et al., 2003). However, the health care costs for exercise interventions on people with KOA have not been reported in Hong Kong. Investigations on the health care costs of exercise interventions could provide information for policy makers to determine the allocation of health care resources.

With regard to the development of the exercise programme, the exploratory qualitative studies identified the major categories in relation to perceptions and experiences of exercise in older Chinese people with KOA. Researchers may build on these qualitative findings to develop assessment tools for assessing clients' perceptions and experiences of exercise in clinical settings. Researchers may also further explore these qualitative findings by using a quantitative approach such as logistic regression modelling to improve understanding of factors influencing exercise adherence in older Chinese people with KOA.

Lastly, exercise adherence is a broad topic which is relevant to various illnesses such as low back pain, osteoporosis, cardiovascular disease, and pulmonary diseases (Jordan et al., 2010; Rhodes & Fiala, 2009). Treatment adherence is also a broad topic that can be applied to a number of chronic diseases, such as renal failure, diabetes mellitus, and hypertension (Bissonnette, 2008; Bosworth et al., 2006). Nurses in their different areas of specialty are recommended to use a similar research approach to that used in this study to develop and pilot health care interventions in different client groups.

Summary of the Implications and Recommendations

In summary, assessments for clients' perceptions and experiences of exercise are implied and should be carried out before the designs of exercise programmes. Similar approach may be used in the development of exercise programmes for clients with other chronic illnesses. Collaborations with professionals from the related disciplines are found importance for successful design of an exercise programme. After more rigorous validations of the exercise programme, nurses may carried out this exercise programme in different settings and integrate it into the various existing services which serve older Chinese people with KOA. Some characteristics of the exercise programme including the design of the exercises that can be carried out at different venues and integrated into the time for watching television, the use of multiple identical classes and the arrangement of a nearby class venue are useful insights for future development of exercise programmes. Lastly, nurse educators may strengthen the nursing curriculum to equip future nurses with more knowledge and skills for teaching exercise.

Further research may test this exercise programme using a more rigorous research design and include a longer follow up period. In addition, future research on exercise adherence is recommended to include an assessment of the participants' return-demonstration of exercises and consider developing a standardized assessment method for return-demonstration of exercises. Moreover, a component of cost-effectiveness analysis is recommended for future studies of exercise interventions in people with KOA in Hong Kong. Researchers may also further study the major categories in relation to perceptions and experiences of exercise in older Chinese people with KOA. Lastly, nurses in their different areas of specialty are recommended to use a similar research approach to that used in this study to develop and pilot health care interventions in different client groups. The next chapter will conclude the Phase I and Phase II study.

CHAPTER SIX

CONCLUSIONS

KOA is a major cause of musculoskeletal pain and disability in the elderly population (Gabriel & Michaud, 2009). Since the older Chinese population is growing very fast in Hong Kong (C&SD of HKSAR, 2008), KOA is likely more prevalent and the healthcare cost it entails is expected to rise exponentially. KOA is one of the top healthcare agenda items that need to be addressed in Hong Kong. Among the various treatment modalities, exercise is an important first-line treatment. The short-term effectiveness of exercise for improving the health outcomes of KOA has been supported by previous studies. The long-term effectiveness of exercise in relation to the clients' continual practice of the exercise is a pressing research topic in healthcare of the older Chinese people with KOA in Hong Kong.

In the literature about exercise intervention in people with KOA, the clients' perceptions and experiences of exercise in relation to their values, beliefs, and living context are highlighted as important data for understanding of the barriers they encountered in integrating the exercise regimen into their daily routine. Hence, the role of clients' perceptions and experiences of exercise is important for improving the long-term effectiveness of exercise by promoting continual practice of therapeutic exercises among the clients. However, there are limited exercise intervention studies in people with KOA in Hong Kong and the client's perspective is being neglected in the development of the exercise intervention.

With an understanding of the healthcare needs in KOA in Hong Kong and in the light of the literature about exercise intervention for people with KOA, this study has been conducted. This study consisted of two phases: Phase I and Phase II.

The Phase I study has explored perceptions and experiences of exercise in a group of older Chinese people with KOA in Hong Kong. It was an exploratory qualitative study that used face-to-face individual semi-structured interviews for data collection. Thirty-one community-dwelling older Chinese people with KOA in Hong Kong were interviewed at their homes. The findings of the Phase I study have improved the understanding of the typical living pattern with KOA among the older Chinese people with KOA in Hong Kong, their self-management of KOA, their practice of exercise, their views about exercise, and their preferences for learning exercise. Some of these findings are culturally specific; for example, the use of self-management methods for KOA originated from concepts of traditional Chinese Medicine and their views about the essence of good exercise. These findings have not been reported in previous studies of older people with KOA. In addition, the findings on the practice of exercise are also specific to older Chinese people with

KOA in Hong Kong and new to the knowledge of exercise in older people with KOA.

The findings of the Phase I study were used to tailor-make an exercise programme for older Chinese people with KOA in Hong Kong. The development of the exercise programme consisted of several stages: (1) identification of the implications for development of an exercise programme from the findings of the Phase I study, (2) identification of appropriate teaching materials from the literature for development of the exercise programme, (3) the development of a draft exercise programme, (4) validation of the exercise programme by an expert panel, and (5) pilot testing of the exercise movements in the exercise programme with two older Chinese people with KOA in Hong Kong. The development and validation processes involved professionals from different disciplines, including a medical officer, a traditional Chinese Medicine practitioner, a sports scientist, two physiotherapists, a social worker, and a community nurse, and also two older Chinese people with KOA; this has strengthened the credibility of the exercise programme. All the development stages are documented and replications of the development process are possible. In addition, the outline of the exercise programme, the detailed content of the exercise programme, and all the materials used in the exercise programme, such as the presentation slides, leaflet, and posters are documented, and thus repeated tests of the exercise programme are possible.

The Phase II study is a pilot test of the acceptability of the newly-developed exercise programme in a group of older Chinese people with KOA in Hong Kong. The Phase II study used a mixed-methods research design; therefore, the quantitative and qualitative data can supplement each other to provide a more comprehensive evaluation of the exercise programme (Creswell & Clark, 2007; Rallis & Rossman, 2003). It was carried out in a community centre for older people and this indicated the feasibility of running the exercise programme in real local settings. The health outcome measures in this study employed both subjective and objective measurements and thus these measurements can cross-check the changes in health outcomes among the participants (Focht, 2006; Fransen & McConnell, 2009). In addition, the inclusion of assessment of the participants' return-demonstration of the exercises has enhanced understanding of the participants' mastering of the exercise skills which is considered as important as it affects the effects of the exercise. The results of the Phase II study provide preliminary information for understanding of the participants' satisfaction with the exercise programme, their adherence to the recommended frequency of practising the exercise movements, their mastering of the exercise movements, their perceptions and experiences of participating in the exercise programme, as well as the therapeutic effects of the exercise programme.

The quantitative results mainly concurred with the qualitative findings. In addition, the participants' subjective reports of their health outcomes at three months after the exercise programme were mainly consistent with the objective assessment results of their physical functioning. The results of the Phase II study were overall positive and support further testing of the exercise programme in a larger scale study.

Therefore, this study contributes to the existing body of knowledge by exploring perceptions and experiences of exercise in a group of older Chinese people with KOA in Hong Kong. This study also integrates the results of this exploratory study into the design of an exercise programme for promoting continual practice of therapeutic exercises in this group of clients. The development of the exercise programme is a contribution to the improvement in the quality of health care for older Chinese people with KOA in Hong Kong. The development process also contributes to the knowledge of research methodology by demonstrating how to integrate qualitative findings into the existing knowledge to develop a new intervention. This methodological approach for developing a client-centred intervention may be applied to the development of interventions for other client groups. In addition, this study also contributes by completing a pilot study of the acceptability of the newly-developed exercise programme in a group of older Chinese people with KOA in Hong Kong; the results of the pilot study provide preliminary findings on the participants' satisfaction with the exercise programme, their adherence to the recommended frequency of practising the exercise movements, their mastering of the exercise movements, and their perceptions and experiences of participating in the exercise programme, and also the therapeutic effects of the exercise programme. The pilot study, therefore, has established the basic facts about the exercise programme and the positive results support the testing of the exercise programme in a larger scale study. The role of clients' perceptions and experiences of exercise in developing exercise interventions for those with KOA is supported in this study. The overall aim of the study, to develop an exercise programme and pilot its acceptability in a group of older Chinese people with KOA in Hong Kong in order to promote their continual practice of therapeutic exercises for KOA, has to some extent been achieved. The way forward is to testing the exercise programme by a larger and more rigorous study in order to obtain more empirical evidence supporting the long-term effectiveness of the exercise programme.

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Phase I Study: Perceptions and Experiences of Exercise in Older Chinese People with KOA (Interview Guide)

Questions	**Prompts**
Can you tell me a typical day of your living ?	Changes in the typical living pattern Reasons for the changes
What do you do to manage the knee osteoarthritis ?	Management strategies – aims, processes, outcomes Source of the information
What is your view about exercise: - in general ? - for the osteoarthritis of your knee(s) ?	Definition of exercise General feelings towards exercise Importance of / motivation for exercise Doing regular exercise Expectation(s) Essence of good exercise Source of the belief(s)
What is your experience of exercise in the past: - in general ? - for the osteoarthritis of your knee(s) ?	Practice of exercise - time slot(s), place, type, frequency, intensity, equipment, responses afterward Source of the information Facilitating / Restricting factors
What is your preference for learning exercise for the osteoarthritis of your knee(s) ?	Motivation Time, Place, Individual / Group - basis Teacher, Type of exercise Mode of delivery (method, duration, & follow-up) Concerns

Phase I Study: Perceptions and Experiences of Exercise in Older Chinese People with KOA

Socio-demographic Data

Age: Sex:

Education: Marital Status:

Type of residence:

Living arrangements:

Employment Status:

Social Assistance:

Religion & its practice:

Clinical Data

First Diagnosis of KOA: by

Left / Right / Both knee(s) affected

Presence and descriptor of pain:

Presence and descriptor of stiffness:

Presence and descriptor of disability:

Medical Prescription for KOA:

Other OA joint(s):

Other medical chronic disease(s):

THE CHINESE UNIVERSITY OF HONG KONG

MEMO

To	:	Prof. Lee Fung Kam Iris The Nethersole School of Nursing
From	:	Secretary Survey and Behavioural Research Ethics Committee (SBREC)
Ext.	:	6238
Date	:	6 December 2002

Survey and Behavioural Research Ethics

I write to inform you that the SBREC has granted approval to you for conducting the following research:

Project Title	: Educational Needs on Self-management in Hong Kong Older People with Osteoarthritis of Knee Joint
Source of Funding	: Student Campus Work Scheme 2002/2003, United College
Reference, if any	: 33

Thank you for your attention.

Sulan.

Sulan Wong

c.c. Director, Research & Technology Administration Office
Panel Secretary concerned

The Chinese University of Hong Kong
The Nethersole School of Nursing

Project Title:
Educational needs on self-management in Hong Kong older people with osteoarthritis of knee joint (original)
Perceptions and experiences of exercise in older Chinese people with knee osteoarthritis in Hong Kong (revised)

Investigator: Lee Fung Kam Iris
Assistant Professor
The Nethersole School of Nursing
The Chinese University of Hong Kong

The purpose of this study is to explore the perceptions and experiences of exercise in Hong Kong older Chinese people with osteoarthritis of the knee joint and to understand their concerns regarding exercise. The findings can provide insights for healthcare professionals in developing exercise programme for older Chinese people with osteoarthritis of knee joint. An about 45 minutes interview will be conducted. During interview questions will be asked regarding your perceptions and experiences of exercise. The interview will be taped. All information obtained will be kept confidential and will be used for research purpose only. The tapes will be erased after completion of the study. Participants are free to deny any answer to specific questions during interview. Participants are also free to withdraw their consents and terminate their participations at any time. All the decisions on the participation of this study will not in any way be discriminated or affect the treatment of the care-recepient.

For any questions related to the study, please contact Prof. Lee Fung Kam Iris at Tel: 2609 6228.

Consent Form for Participants

THIS IS TO CERTIFY THAT I, ____________________ HEREBY agree to participate voluntarily in the above named study.

I hereby give permission to be interviewed and for these interviews to be tape recorded.

I understand that I am free to deny any answer to specific questions during interview.

I also understand that I am free to withdraw my consent and terminate my participation at any time.

I understand that my decision on the participation of this study shall not in any way be discriminated or affect the treatment of the care-recipient.

____
Signature (Participant)

Date: ____________________

香 港 中 文 大 學
那 打 素 護 理 學 校

研究題目： 香港患有退化性膝關節炎的長者對運動的看法及體驗(修正)
香港長者在自理退化性膝關節炎方面所需的教育(原本)
研究者: 李鳳琴女士 – 現任香港中文大學那打素護理學院助理教授

此項研究旨在探討長者在自理退化性膝關節炎及運動方面的看法及體驗，從而瞭解他們在運動方面所需的教育。研究所得的結果將會有助於醫護人員提供更有效的服務，促進患有退化性膝關節炎的長者的健康。參加者需接受一次約 45 分鐘的面談，內容主要是有關於在自理退化性膝關節炎及運動方面的個人看法及體會，面談內容將會被錄音。面談所得的資料將會絕對保密，只會用於學術及研究上，錄音帶亦會於研究完成後被銷毀。參加者有權不回答任何面談中的提問，並有權隨時退出此項研究，而不會受到歧視，亦不會影響參加者在門診所得的服務。

如有關於此項研究的問題，請致電李鳳琴教授，電話號碼：2609 6228。

參加者同意書

本人 ________________________ 在此聲明同意參加上述研究，名為香港長者在自理退化性膝關節炎方面所需的教育。

本人同意接受面談並准予錄音。

本人明白本人有權不回答任何面談中的提問。

本人亦明白本人有權隨時退出此項研究。

本人明白無論本人是否同意參加此項研究，均不會受到歧視，亦不會影響本人在門診所得的服務。

____
參加者簽署

日期：______________________

Duration of Interview: 55 minutes

Participant Code	Number of question and response	Transcription (translated)	Coding
23	I1	Mr. Chu, well, could you tell me about your daily life, as in how do you spend a regular day starting from morning, for example, what do you do when you wake up in the morning?	
23	P1	Well, morning… I wake up at around five, give or take 10-15mins…so let's say approximately 5am.	
23	I2	5am	
23	P2	After waking up, I eat a bit and take my medicine, some have to be taken before meals… after that there will be another round of medicine, because you have to eat something before you take aspirins. Then, I go do my morning exercise, Tai Chi class… which the LCSD (Leisure and Cultural Services Department) organized… it's about an hour between 6.30 and 7.30, you know how the old people play Tai Chi, like this…	
23	I3	Mm… and then? What do you do after exercising?	
23	P3	After doing my exercise at around 8am, I will sometimes go out. There's a centre called the Lutheran Church at Lik Yuen Estate. I usually go there and read some newspapers… after reading, which is some time after 8, I will go Yum Cha, and after that, I will go home.	
23	I4	Mm…	
23	P4	This is what usually happens every day.	
23	I5	Then what do you do when you are back at home?	
23	P5	Home?	
23	I6	Yes, at around what time will you be back home?	
23	P6	Sometimes it will be around 9.30 when I reach home… then I will write, read or do something by myself.	
23	I7	Mm…	
23	P7	Yea, that's it.	
23	I8	And then…	
23	P8	And then…em… I normally take medicine 3 times a day	
23	I9	Mm…	
23	P9	Medicine at 11.30, and lunch at around 12noon.	
23	I10	Mm…	
23	P10	Well, after watching the 1pm news, at around 1.30 or 2, I take my afternoon nap; I will sleep until 3, then wake up and eat something. Ah, basically I stay at home most of the time until around 7 or a quarter past 7, then I take my dinner.	
23	I11	Mm…	
23	P11	I might do a bit of writing after dinner, and sleep at 10. It's almost the same thing every day.	

Duration of Interview: 55 minutes

23	I12	Mm, is this a daily routine you adopted after you have knee osteoarthritis or have you been having the same lifestyle before you're diagnosed with knee osteoarthritis?	
23	P12	I did factory work before I have knee osteoarthritis, it was a very different lifestyle back then.	
23	I13	Mm…	
23	P13	Back then work at the factory started at 8, which meant I had to wake up at around 6, then there was traveling by bus, eating and so on… work started at 8 and I worked till almost 5 before I could get off work.	
23	I14	Mm…	
23	P14	Well once off work, I would come home and have dinner.	
23	I15	Mm…	
23	P15	Well, life was like that when I used to work.	
23	I16	Mm, you actually didn't exercise back then.	
23	P16	Yes, it was not like you could exercise whenever you want, there was no time.	
23	I17	Mm, so you retired in the year 2000.	
23	P17	Yes, the year 2000.	
23	I18	And have since picked up Tai Chi?	
23	P18	Yes, I was strolling in the park and saw a group practising Tai Chi, so I called the LCSD to ask about the course, and then signed up, and have been having Tai Chi lessons till now.	
23	I19	Mm, that means the main reason for your change in lifestyle is retirement?	
23	P19	Yes.	
23	I20	And it is not related to your knee osteoarthritis?	
23	P20	No it's not related, I have always had a bad knee.	
23	I21	Mm, so, I want to ask, you suffer from knee osteoarthritis, what will you do when you have an inflammation… what will you do to help relieve the pain?	
23	P21	Nothing much, I will apply some bruise ointment; actually, I don't use them often, perhaps only a few times a year.	
23	I22	Mm…	
23	P22	By few I mean I only use them when it's serious, normally I will ignore the pain and it will gradually go away.	
23	I23	Mm…	
23	P23	And if it gets serious, that means when your legs feel limb when you stand, then I'll go see one of those family doctors.	
23	I24	Mm…	
23	P24	Then the doctor will say, I should have an injection or have some medicine, that is an indicator of fees. Normally I have to see him twice and take 4 days of medicine.	
23	I25	Mm...	
23	P25	Then the pain will gradually go away.	

Duration of Interview: 55 minutes

23	I26	Mm, that means you would normally only treat your knee when it hurts, and you will normally apply bruise ointments.	
23	P26	Not really, it always hurts, it's like, you will feel it when you are walking home after practising Tai Chi in the morning.	
23	I27	Mm…	
23	P27	And once it hurts again, and you can still feel it when you eat, you know, those tiny tinges of pain… if it persists all the way till night time after my shower, then I will apply the ointment before I go to bed, rub my knee a bit and it won't feel as painful. Sometimes when I sleep at night, just like these days, it hurts on both sides while I sleep.	
23	I28	Mm…	
23	P28	The pain is nothing serious, but you feel a slight strain and have tense tendons.	
23	I29	Mm, but then you bear with the pain and only at times apply ointments?	
23	P29	Yes.	
23	I30	Would you do anything about it?	
23	P30	No no, not really.	
23	I31	Mm... so you would consult a private doctor when it sometimes get really inflamed?	
23	P31	Yes, when it's inflamed, by inflamed I mean you can't even lift your leg, and even if you can it feels really stiff.	
23	I32	Mm, so when you say there's an inflammation, does it mean it gets extremely painful or do you personally feel you have trouble lifting your leg? For example, will you consult a doctor when you can't perform your daily activities?	
23	P32	Exactly, yes!	
23	I33	So you do consult a doctor when you can't perform your daily activities.	
23	P33	Not simply because I can't perform daily activities, but also when my whole body… generally feels uncomfortable.	
23	I34	Mm...	
23	P34	So in other words, my whole body doesn't feel right, not just my knees.	
23	I35	Mm…	
23	P35	And when you see a doctor, you also receive an injection.	
23	I36	Mm…	
23	P36	In roughly an hour's time, I won't actually feel as painful.	
23	I37	Mm… so, does that mean for example, when it's not inflamed, that the pain is not that serious?	
23	P37	Exactly!	

Duration of Interview: 55 minutes

23	I38	Mm... that means you usually choose to bear with the pain when you can, or simply apply some bruise ointment?	
23	P38	Yes exactly.	
23	I39	Mm, and are those bruise ointments effective?	
23	P39	They are effective, you don't feel as painful after you apply it.	
23	I40	Mm…	
23	P40	That's for me at least, I am not sure about the other elderly people.	
23	I41	Mm… so apart from applying ointments or going to a doctor, do you think for example, that sports and your knee condition are actually related?	
23	P41	Sports and my knee, well I think for me, sports will mean Tai Chi…	
23	I42	Mm…	
23	P42	Knees don't hurt when I do Tai Chi…	
23	I43	Mm…	
23	P43	My knees won't hurt and I can walk normally, otherwise, before I practise my Tai Chi, I staggered a bit and my legs felt limb.	
23	I44	Mm…	
23	P44	Those Tai Chi that you practise, have moves that are good for your knees.	
23	I45	Mm… so do you actually know that practising Tai Chi can help your knee when you first started it?	
23	P45	I…	
23	I46	Or do you think it might help?	
23	P46	I have never thought that it would specifically help my knee condition, but when I first started Tai Chi, I treated it as a hobby.	
23	I47	Mm... but then as you learned more, you actually found that it helped?	
23	P47	Yes it did.	
23	I48	Mm...	
23	P48	It's really good	
23	I49	Does that encourage you to continue to practise Tai Chi?	
23	P49	Ah, even if it didn't help I would probably continue, I am very interested in Tai Chi.	
23	I50	Mm…	
23	P50	I like it, so I go every morning, even when it rains, I will find a place to practise by myself. I have practised Tai Chi for some 4, 5 years, so basically I already know the whole set of movements.	
23	I51	Mm…	
23	P51	So I do some Tai Chi in the morning to entertain myself.	

Duration of Interview: 55 minutes

23	I52	Mm, so, have you actually heard of other ways that could help your knee osteoarthritis?	
23	P52	Well, at that time at the Lutheran Church, there was one at Lik Yuen Estate, there were some physiotherapists, so normally we would do some physiotherapy there.	
23	I53	Mm...	
23	P53	I've done it around 3 to 4 times, but the effects were not as good as Tai Chi.	
23	I54	Mm…	
23	P54	I am talking about the effectiveness.	
23	I55	Right.	
23	P55	The physiotherapist had me step on something, or had me cycle for 10minutes, or covered my knee with something...	
23	I56	Mm…	
23	P56	It's like, after all the therapy, I couldn't exactly feel its effects.	
23	I57	So, in the physiotherapy courses that you had back then, did they teach you how to exercise or, did they help you exercise?	
23	P57	They helped me with my exercise, it was not a course.	
23	I58	I see.	
23	P58	Well at the beginning there were some places where you could do physiotherapy, it was at Wai Wah Centre. They charged regular fees, but then, at the Lutheran Church, they would do it at a 40% discount.	
23	I59	So it was cheaper.	
23	P59	It's cheaper, so I signed up, and had therapy with them about 4 times, but then I couldn't feel the effects, so at the end I quit… didn't join them anymore.	
23	I60	How often were those sessions?	
23	P60	Well, at first, I would have 3 sessions per week.	
23	I61	3 sessions per week...	
23	P61	Yes, right at the beginning and I had…	
23	I62	Had 4…	
23	P62	For around 2 weeks, and then I thought it wasn't that effective, so I stopped	
23	I63	Mm...	
23	P63	So I stopped, and it was not only me, there were other elderly people too.	
23	I64	Mm...	
23	P64	Like I said, I don't think the therapy was effective.	
23	I65	Mm...	
23	P65	Really it wasn't, so naturally you wouldn't consider continuing right? It was only for a short period.	
23	I66	So, how long was the physiotherapy… per session?	
23	P66	1 hour	

Duration of Interview: 55 minutes

23	I67	1 hour	
23	P67	The session was one hour.	
23	I68	Meaning it was pure therapy in that 1 hour?	
23	P68	Not really, it was 1 hour, but technically speaking the therapy lasted only 40-45mins. You actually did real work in those 40-45mins, as the therapist would use the first 10-15mins for explanation. So, therapy was only around 40-45mins.	
23	I69	Mm...	
23	P69	They had one of those bicycles fixed on the ground...	
23	I70	Mm...	
23	P70	And so I would pedal and pedal, pedal for I don't remember how long.	
23	I71	Mm... did the therapist explain to you, or tell you that those exercise could help your knee osteoarthritis?	
23	P71	He did say something about knee osteoarthritis, and that if you exercised, it would hurt less. Basically he was telling me that therapy could prevent the condition from getting more serious, sort of like preventing it from worsening.	
23	I72	Mm... then did he mention how you could prevent it from worsening?	
23	P72	No, no he didn't	
23	I73	So did he further explain what improvements you could have made to stop the condition from worsening?	
23	P73	No.	
23	I74	Mm... you went there for 2 weeks… did you only exercise when you were there? Did you exercise at home?	
23	P74	No I didn't	
23	I75	Why not?	
23	P75	Well I don't have the equipment to start with. The therapist recommended cycling and also to do something with that machine that looked like a radio. That machine had an electric plug, you know, those where they shielded your knee with some cup-like thing... but I don't have those equipment at home.	
23	I76	Mm…	
23	P76	So, no equipment, no exercise.	
23	I77	Okay, so apart from physiotherapy, are there any other ways, say, for example from the doctor when you consult one, or from nurses, or at the elderly centre, or some courses, where you could learn more about preventing your knee osteoarthritis from worsening?	
23	P77	Ah, there're some seminars, sometimes, actually quite often, there will be nurses, those from the Nethersole Hospital especially, who come and hold seminars. But unfortunately those times don't fit me, so I don't go, but yes there are occasionally some seminars.	

Duration of Interview: 55 minutes

23	I78	mm…	
23	P78	Those nurses, they hold meetings, and they talk about arthritis, not just knee osteoarthritis, but also many other types of arthritis.	
23	I79	Mm...	
23	P79	Say for example the shoulder... they talk about a lot of different body parts.	
23	I80	But then, in those seminars, do they give you information as to how you could treat your knee osteoarthritis?	
23	P80	They... I've been to those seminars once or twice, they do teach you those. They teach you how to protect yourself in your daily life, especially your back: if you are carrying something, don't bend your back. Instead you should squat then slowly pick up the object. So yes, the nurses do explain.	
23	I81	Mm...	
23	P81	Yea, they use projectors too.	
23	I82	Can you remember what they have explained to you about knee osteoarthritis?	
23	P82	They did have those seminars, but I didn't join.	
23	I83	Okay, so you didn't attend, but, how about those bruise ointments? Do you have to use it every day?	
23	P83	Every day, though this wasn't the case before. It hurts every day now, say, for example, you probably can't walk any more after walking for 30mins these days, it gets too painful.	
23	I84	Mm...	
23	P84	So in other words, I don't go out often, my knees feel best when I have just finished my morning exercise, they don't hurt.	
23	I85	And you would use the ointment...	
23	P85	No, only at night.	
23	I86	Right, so you use it…	
23	P86	Before I go to bed…	
23	I87	So the legs feel better after some exercise...	
23	P87	Yes, they don't hurt after my exercise, my legs feel perfectly fine.	
23	I88	So, no pain after exercising?	
23	P88	Exactly.	
23	I89	So, you will only use the bruise ointment once before you go to bed.	
23	P89	Yes yes yes	
23	I90	Mm... why do you choose to apply the ointment before you go to bed?	
23	P90	The ointment itself suggests less frequent usage, at most twice a day...	
23	I91	Mm.	
23	P91	So in the mornings I... say today, I don't feel painful so I don't have to use the ointment.	

Duration of Interview: 55 minutes

23	I92	Mm...	
23	P92	And towards bedtime I will gradually feel slightly painful, so I will use it before bedtime, and my knees will hurt less.	
23	I93	And you can sleep better.	
23	P93	Yes, sleep better.	
23	I94	Mm, when you see a doctor, did he/she tell you anything about…	
23	P94	The doctor?	
23	I95	I am referring to your knee osteoarthritis.	
23	P95	That doctor, I never had an X-ray with him, but I did with the one before him. The doctor read my X-rays and said the joints were deteriorating, the softer bones were weakened.	
23	I96	Mm...	
23	P96	Hence my condition.	
23	I97	Did he explain the reason to you?	
23	P97	Yes he did explain.	
23	I98	So what can we do to save the knees?	
23	P98	P: He recommended me to take those "bone pills", I have taken them for some 10 years, this and this (searching) Woman: What are you looking for? P: Pills for my kneee Woman: ah, that that that one.	
23	I99	Okay	
23	P99	Woman: XXX, (name of medication) XXXX	
23	I100	Mmm. is it helpful?	
23	P100	Mm, it helps, the med is soothing and it protects the knee from further damage.	
23	I101	Mm...	
23	P101	Woman's voice: I have been taking those for a long time P: This type of bone pills have been recommended by doctors for more than a decade. Woman's voice: 10, almost 20 years, XXX (doctor's name) recommended it.	
23	I102	Ah.	
23	P102	P: I was told that it helps, and it sort of acts like a lubricant. Woman's voice: XXX eats those too, but the bottle does not look like that, it's much larger. P: oh, those are bottles for 500 pellets, this one is for 80 pellets Woman: Right it's this kind of medicine.	
23	I103	Mm...	
23	P103	Well, so I have been taking those pills, and they work quite well.	
23	I104	Mm...	
23	P104	P: Perhaps now that I have stopped taking them, the condition actually gets worse. Woman: I've been taking them for around 20 years.	

Duration of Interview: 55 minutes

23	I105	Mm...	
23	P105	Woman: XXX (name of a doctor) recommended them. P: right. Woman: Here, 10, actually 20 years...	
23	I106	So basically… eating bone… pills.	
23	P106	Basically this kind if I take pills.	
23	I107	Mm...	
23	P107	This I take every day, 3 times per day.	
23	I108	So…	
23	P108	After meals.	
23	I109	Mm... so doctors would normally recommend you to take pills.	
23	P109	P: That… Woman: That one over there, he goes to a private doctor , and the doctor recommended him to buy those pills.	
23	I110	Mm...	
23	P110	Woman: He bought them under his recommendation, so we bought some ourselves.	
23	I111	Mm… did the doctor mention things like exercise?	
23	P111	Exercise, well, every doctor talks about exercise... Exercise is of course good. You have fewer diseases if you exercise… you can see many people exercising in the morning. You can easily spot them at the park…	
23	I112	Mm…	
23	P112	People nowadays understand the importance of exercise… Normally, the doctor will always ask if you exercise, and they say you have to exercise and so on… Well, I have always known that exercising is good …	
23	I113	Mm, so what in your opinion, are activities that can be considered as sports?	
23	P113	Sports, normally I will do sports, and sweat.	
23	I114	Mm...	
23	P114	I sweat a lot, and I have to almost change every piece of clothing I wear because I sweat so much…	
23	I115	Mm…	
23	P115	Basically everyday, I do sports, 30 minutes everyday.	
23	I116	Mmm…	
23	P116	That means I do 1.5hours of sports, if you count the one hour Tai Chi class that I take.	
23	I117	Mm... so, as you have just said, according to this present lifestyle, you only exercise in the morning?	
23	P117	Yes, I exercise in the morning, I don't normally exercise at other time, because even if I attempt to do so, once I walk, my knees will hurt again.	
23	I118	Mm, but you mentioned just now that your knees feel better after doing exercise?	
23	P118	Yes you are right.	

Duration of Interview: 55 minutes

23	I119	But, you normally will also…	
23	P119	The effects are only good for a short period of time, only within the hour while I exercise.	
23	I120	Mm...	
23	P20	Say, for example, when I walk home after my Yum Cha, it hurts too, basically it hurts when I walk.	
23	I121	Mm, then have you considered exercising at other times of the day? Like in the afternoon or evening? That way you might feel better...	
23	P121	No, no, it won't work at those times, only the morning sessions seems to be more effective.	
23	I122	Mm...	
23	P122	Well I have tried, I've tried taking a walk at night, but it just doesn't work, the pain's still there.	
23	I123	Right, so it's only in morning sessions…	
23	P123	It's only the morning sessions, perhaps it's because I have enough rest from a long night of sleep.	
23	I124	mm...	
23	P124	That way I will be in better physical condition, with enough energy you can say. I have tried exercising longer than usual, but once I pass the time limit , my body can't seem to support it.	
23	I125	Mm, so you think that you can't do sports for a long period of time.	
23	P125	Right, you can't do too long, sometimes, and I mean sometimes, you can reach the limit even in half an hour and you shouldn't exceed that.	
23	I126	Mm…	
23	P126	There was one time when I went to the Mainland, and I did some sports and swimming, I swam for more than 2 hours, and I felt I was floating and such... this tells you that you should not over-exercise, otherwise it will produce adverse effects.	
23	I127	Mm, you have mentioned just now that you must sweat when you do sports, does that mean that you have to do vigorous moves and sweat a lot before you'll consider that activity a sport?	
23	P127	You will naturally sweat, everyone sweats when they do sports, sweating makes you feel better.	
23	I128	Mm... say for example, some old ladies like to fling their arms a bit at the park, is that exercising?	
23	P128	I am not sure about that, but I suppose old ladies… those I see normally insist on taking a walk in the mornings, even if they need walking sticks. People nowadays understand the importance of exercise/sports.	
23	I129	So do you think that walking around is a sport?	
23	P129	Well, considering her age, I think that could be considered as a sport.	
23	I130	Mm…	
23	P130	Her condition might get worse if she doesn't walk at all.	

Duration of Interview: 55 minutes

23	I131	Mm…	
23	P131	I have come to notice an old lady for almost 3 years, when I first saw her, she was walking around with her walking stick every day, and she didn't look sick at all.	
23	I132	Mm…	
23	P132	She goes to the community centre in Lik Yuen Estate's terrace, I see her strolling and she seems to be in good shape and good spirited.	
23	I133	Mm...	
23	P133	She strolls around every morning.	
23	I134	Mm, so do you think that sweating produces a much better effect than when you don't sweat while exercising?	
23	P134	Of course it is much better if you sweat. If you don't sweat… or take myself as an example, I will sweat even when it's cold or in winter…	
23	I135	So if you didn't sweat, you wouldn't consider yourself as having done exercise?	
23	P135	Yes you are right.	
23	I136	Mm, so for example, you have mentioned Tai Chi just now, as well as swimming, taking a walk etc, what is the difference between these sports and the exercise you do to treat your knee osteoarthritis?	
23	P136	In my case...	
23	I137	Is there a difference?	
23	P137	If you take my knee osteoarthritis into consideration, I think Tai Chi is the most suitable.	
23	I138	Mm...	
23	P138	Because if you walk, or do any type of working, you could hurt both knees.	
23	I139	Mm...	
23	P139	Say when you practise Tai Chi, a set of moves can be completed in around 20 minutes.	
23	I140	Mm…	
23	P140	…and you will still feel fine.	
23	I141	Mm…	
23	P141	After the Tai Chi session, my 2 knees feel less painful.	
23	I142	Mm…	
23	P142	When you exercise every morning, you will feel this Qi energy inside your body. It's shapeless, but you can feel it circulating inside… Exercising can improve blood and Qi circulation. That's probably the main reason.	
23	I143	So, between Tai Chi and taking a walk, you feel that Tai Chi is more suitable?	
23	P143	Well because Tai Chi is a mild sport, you wouldn't understand if I tried to tell you now, you have to practise it for some time before you'd understand. You feel absorbed while you practise Tai Chi.	

Duration of Interview: 55 minutes

23	I144	Mm...	
23	P144	It's really good because while you practise, you will stop thinking and deliver the moves slowly, in turn you will move slowly too, meaning you won't strain your tendons like you do when you play actual sports, which I think can get quite vigorous.	
23	I145	So that means Tai Chi is relatively slower?	
23	P145	Yes	
23	I146	And when you say mild it means…	
23	P146	It means…	
23	I147	It means it's not…	
23	P147	It feels calm.	
23	I148	Vigorous… oh, so it's the heart…	
23	P148	Say if you are physically fit, you would practise… and despite its mild movements, there is Qi that flows through your body.	
23	I149	So, what you are trying to say is that the flow of Qi helps improve your knee osteoarthritis?	
23	P149	Yes.	
23	I150	Summarising what you have just said, you generally think that playing sports is good, do you have other views on that?	
23	P150	Sports... it's different for everyone, for me I like Tai Chi, but for other people it could be other types of sports.	
23	I151	Mm...	
23	P151	Everyone has different tastes, you would most likely say that playing your favorite sports every day does good to your body.	
23	I152	Mm, we can say that regular sports help relieve the pain from your knee osteoarthritis just like Tai Chi, there isn't much difference right?	
23	P152	No, because if you have knee osteoarthritis or arthritis at another part of your body, there are certain sports that you can't do.	
23	I153	Can you give an example?	
23	P153	Say for example dumbbells or springs, or say running—those certainly are not suitable exercises for me.	
23	I154	Not suitable because your knee osteoarthritis has prevented you from doing that?	
23	P154	Right, exactly. Since I can handle Tai Chi's movement without much pain, some sports could probably achieve the same effect.	
23	I155	Mm...	
23	P155	Say for me with knee osteoarthritis, I can't do a lot of things.	
23	I156	In other words, the difference between a certain sport that can alleviate the pains of knee osteoarthritis and a regular sport lies on whether the sport is slow and mild, or one that matches your ability?	
23	P156	Yes, because generally speaking, those sports have to be done slowly when you have arthritis.	

Duration of Interview: 55 minutes

23	I157	Mm...	
23	P157	You actually end up exercising your whole body, because unlike other sports, Tai Chi requires movement of the whole body.	
23	I158	So there has to be a suitable amount of exercise?	
23	P158	It means that despite practising one Tai Chi movement set only takes 20 minutes, you can actually exercise you whole body: hands, eyes, head, waist.	
23	I159	So Tai Chi exercises the entire body, but do you think that such amount of exercise is necessary when you only want to ameliorate your knee osteoarthritis?	
23	P159	It's not like you can entirely heal it, but at the very least you can prevent the condition from worsening [paused for 10 seconds] Exercise in this sense can't do much in improving it. Rather it keeps it at its present level and makes them hurt less.	
23	I160	Mm, so your aim is to keep exercising?	
23	P160	Yes.	
23	I161	So, do you think it will help?	
23	P161	I think it does help.	
23	I162	How can doing sports help?	
23	P162	Like I have said earlier, when I finish my exercise, my legs function very well.	
23	I163	Mm...	
23	P163	They don't hurt.	
23	I164	Mm...	
23	P164	Yet if you wait for an hour then walk again, the pain will come back, especially if you walk for longer periods of time.	
23	I165	Mm...	
23	P165	That, is the reason.	
23	I166	And if you don't exercise…	
23	P166	If you don't exercise, your legs will hurt when you walk even in the morning, and you will find it hard to lift your feet; however, when you exercise, it won't hurt and you can lift your feet as usual.	
23	I167	Mm... so you…	
23	P167	Which means…	
23	I168	So will you feel for example, that your have become less fit if you stop doing exercise for some time?	
23	P168	If you stop doing exercise in the long run, your body… well you won't feel as high spirited.	
23	I169	So generally speaking, your knees will hurt less when you exercise. Are there other effects too, such as better moods and such?	
23	P169	I tend to be in a good mood after exercising.	
23	I170	Mm...	
23	P170	It's like, if you don't exercise that day, you tend to feel that there are things waiting to be done.	
23	I171	Mm...	
23	P171	It doesn't feel very comfortable.	

Duration of Interview: 55 minutes

23	I172	Mm...	
23	P172	When you exercise every morning, you will feel this energy inside your body, it's shapeless but you can feel it circulating inside.	
23	I173	Mm, so, can you give some examples as to what good sports are?	
23	P173	There are a lot of exercises that you can take part in, I personally like Tai Chi, but other people may have different preferences.	
23	I174	But, are there certain elements that make a type of sports good?	
23	P174	They are mostly hobbies.	
23	I175	But…	
23	P175	You can't say that anything is good or bad. If you have the determination, you can walk for 30 minutes every morning…	
23	I176	Mmm…	
23	P176	…and it will still be a good thing. Whatever you do, you need to have the determination to do it every day. And if you don't exercise regularly, basically you can't maintain your health. You need to make it a routine, and then you can get the benefit out of it… For example, once or twice per week is no use. You have to do it every day. You have to fix a time for it… And at least 30 minutes every session. Only then will it be effective.	
23	I177	Mm…	
23	P177	And if you don't want to do anything, then basically you won't… let's say you will be less willing to do so.	
23	I178	So you are trying to say that taking a walk every day means getting routine?	
23	P178	Yes exactly.	
23	I179	So you can't just do something then quit after some time.	
23	P179	Exactly.	
23	I180	So when you practise Tai Chi for an hour, do you normally…	
23	P180	It's not one hour technically speaking…	
23	I181	Technically speaking…	
23	P182	One set of Tai Chi moves can be completed in 20-25 minutes.	
23	I183	And you…	
23	P183	You have to do warm up, move your arms a bit etc.	
23	I184	So you warm up and then practise Tai Chi.	
23	P184	Yes.	
23	I185	Do you have to warm up (cool down) again after practising Tai Chi?	
23	P185	You have to move a bit, or else the blood circulation would not be as smooth.	

Duration of Interview: 55 minutes

23	I186	Mm...	
23	P186	At least you have to move moderately for about 5minutes so that the blood can circulate to maintain a balance. You can't just finish you exercise and immediately sit down, it's not good for you.	
23	I187	So sitting down all of a sudden is not good.	
23	P187	Yes, if you exercise and you want to sit down, it's best if you stand for a bit first.	
23	I188	Okay, and then you would come here?	
23	P188	To Yum Cha	
23	I189	To Yum Cha, okay…	
23	P189	And then come here after Yum Cha.	
23	I190	Do you like to exercise alone or exercise with a group?	
23	P190	Based on my personal experience, I prefer exercising alone.	
23	I191	Okay	
23	P191	You might want to slow down on certain movements but if you are with a group, you have to move faster if the group prefers to do so.	
23	I192	Mm...	
23	P192	If you exercise alone you can have it your own way.	
23	I193	Mm...	
23	P193	It's better in this case that you practise alone.	
23	I194	But are there any points that make practising with a group favourable?	
23	P194	Not really, because what I practise and what they practise-- the movements are the same.	
23	I195	Mm, then where do you like to do your exercise?	
23	P195	The most ideal place is one with good air and a few people walking about. Air in the morning is better. Open space with greenery such as park is an ideal place for exercise.	
23	I196	Mmm...	
23	P196	Say if I exercise here and suddenly a smoker passes by and puffs out smoke, you will almost inhale them directly. Breathing is very important when you exercise, even if you avoid working out at that spot, the smoke will inevitably drift to where you are at.	
23	I197	Mmm...	
23	P197	You really inhale quite a bit of smoke considering the huge amount of exercise you do.	
23	I198	Mm…	
23	P198	You don't smoke so it is fine, but you can smell where the smokers are even when you are very far off.	
23	I199	Mm…	
23	P199	That means breathing is unobstructed.	
23	I200	Well you don't have to worry if you practise at home then?	
23	P200	There is not enough space, some moves have certain steps you have to follow, such as moving forwards and backwards.	

Duration of Interview: 55 minutes

23	I201	Mm...	
23	P201	Then there won't be enough space.	
23	I202	Mm...	
23	P202	There should be open space	
23	I203	So the main reason is the lack of space?	
23	P203	Yes yes.	
23	I204	...while the air might actually be better at home?	
23	P204	Yes.	
23	I205	You emphasized that sports should be mild and slow, but if you do other more vigorous sports, would it be acceptable if you put in less effort, so long as you have moved around a bit?	
23	P205	Don't underestimate Tai Chi, it looks effortless and slow, but you could sweat more from doing Tai Chi than from other more vigorous sports because it controls your breathing.	
23	I206	Wow, so you have to coordinate your breathing when you practise Tai Chi?	
23	P206	Yes, a lot of breathing techniques are involved, say, if I am practising Tai Chi, I can smell that a smoker have passed by the wall, even if they have long left.	
23	I207	Does that mean breathing is synchronized with movement so that the actual use of force or strong movements is not as important?	
23	P207	Yes it's very important, if your breathing is obstructed it might be harmful to the body.	
23	I208	Mm...	
23	P208	All sports are good since they help you breathe properly.	
23	I209	So are you saying that good breathing techniques and the energy flow inside the body will help your knee osteoarthritis?	
23	P209	It...	
23	I209	Like it is not a problem of whether you have put a lot of physical effort.	
23	P210	No it's not like that, there is one move that helps to make my knee feel better, it's the action itself.	
23	I211	Which move?	
23	P211	Moves such as these... (demonstrates)	
23	I212	Mm...	
23	P212	Like this.	
23	I213	So you are half crouching?	
23	P213	That move called 斜飛細(勢) where you stride forward with a twist and a series of hip lunges.	
23	I214	What is that move called again?	
23	P214	斜飛細(勢), it has a similar effect with other moves from physiotherapy.	
23	I215	The knee feels like it just did physiotherapy?	
23	P215	P: yes yes. Woman: those moves are very well known, those XXX	

Duration of Interview: 55 minutes

23	I216	I am afraid I have not heard of them.	
23	P216	P: That move is a bit like doing… Woman: Yes it is very famous P: The entire sequence has a couple of moves similar to this one.	
23	I217	Mm...	
23	P217	So you would practise those moves, and you have those 雲斗立 (where one balances with one foot raised) which the old people would do.	
23	I218	Mm...	
23	P218	It's one of those moves where you try to maintain the "centre" and that, is 雲斗立	
23	I219	Wow, you have mastered those moves very well	
23	P219	Woman: he sits and practise, if people see you they will think that you are crazy (laughs)	
23	I220	Haha right.	
23	P220	So we practise moves like these.	
23	I221	Mm...	
23	P221	That's why…	
23	I222	The knees will feel better.	
23	P222	It is especially good for the knee, and you have to maintain your centre of balance.	
23	I223	Why do you think that these few moves are especially good?	
23	P223	Well not just these, the entire sequence has many more moves	
23	I224	I know, but moves that are specifically good for the knee?	
23	P224	All moves from this set of Tai Chi moves are good for the knee.	
23	I225	Mmm…	
23	P225	Say for example (demonstrates), there are some moves like this, they…	
23	I226	Mm...	
23	P226	Help maintain the centre of balance	
23	I227	Mm, so are there certain considerations that compelled you to quit exercising?	
23	P227	Well if there is an inflammation, and I can't even walk, then how can I exercise? (laughs)	
23	I228	(laughs) right.	
23	P228	So, unless there is an inflammation, otherwise I will definitely exercise.	
23	I229	Then how about when it's raining heavily or when there're typhoons?	
23	P229	when there are storms I would… Woman: when typhoon number 3 is hoisted... Estates like Lik Yuen and Wo Che, they have centre courtyards…	
23	I230	Heh?	
23	P230	Which means they have open areas there.	
23	I231	Oh.	
23	P231	Naturally you will practise there if it's an open area.	

Duration of Interview: 55 minutes

23	I232	You would continue practicing?	
23	P232	Raining is not a problem…	
23	I233	Raining is not a problem…	
23	P233	Heh?	
23	I234	Say when you don't have company and you are alone?	
23	P234	No I will still practise, it may even be better alone… will have better time control since you may need more time to practise certain moves, if you practise with a group, other people may not like it if you take too long.	
23	I235	Then do different seasons affect your habits?	
23	P235	No, even the cold can't change my habit.	
23	I236	Mm...	
23	P236	If it is very cold, you can even wear fewer layers of clothing than others, since you will exercise and warm yourself up.	
23	I237	Wow	
23	P237	For example you will wear an extra shirt and jacket when it's 5 or 6 degrees cold, but if you exercise, you can take off the jacket and shirt and still won't feel cold.	
23	I238	Are there other reasons, apart from inflammation, that would stop you from going to exercise?	
23	P238	No I don't think so.	
23	I239	Mm...	
23	P239	I will definitely exercise, regardless what.	
23	I240	Mm, What motivates you to exercise? You have mentioned that your knees won't hurt when you exercise.	
23	P240	I think it's the energy flow you build up when you exercise, it keeps your body feeling good, even after your exercise session.	
23	I241	Mm…	
23	P241	So good that everything: the food and the tea, tastes better when you go Yum Cha?	
23	I242	Mm…	
23	P242	And if you don't exercise, the food and tea at Yum Cha is less good and you don't feel like eating.	
23	I243	Your appetite won't be as good?	
23	P243	Yes, it is not as good.	
23	I244	Do you think that doing sports can keep you healthy and fit, where with your age, a habit of exercising keeps you healthier?	
23	P244	And it really is proven, because I have high blood pressure and in those first 20 or so years my…	
23	I245	Mm…	
23	P245	… my condition was not very stable, and at times it would rise to pretty high levels.	

Duration of Interview: 55 minutes

23	I246	Mm…	
23	P246	Despite taking medication the level was still high, same thing with cholesterol levels, the doctor would tell me that they had gone higher every time I went for a check up.	
23	I247	Mm...	
23	P247	So my blood pressure tended to be on higher levels...	
23	I248	Mm...	
23	P248	But it's different now, the last time I went, the doctor reported that my cholesterol level was even slightly lower than average levels.	
23	I249	Mm...	
23	P249	And blood pressure had gotten to better levels too.	
23	I250	Mm...	
23	P250	And I also have my liver, lungs and diabetes checked regularly... no he did not say that those have improved, just mainly on how my cholesterol and blood pressure levels were maintained at satisfactory levels.	
23	I251	Mm...	
23	P251	That proves exercising helps.	
23	I252	So, if I teach you another sport, would you be interested to pick that up?	
23	P252	It's not whether I am interested in it or not , but at my age my physical fitness cannot cope with a second sport, the second sport might not have the effects of…	
23	I253	Tai Chi	
23	P253	Tai Chi.	
23	I254	Mm...	
23	P254	And that way I can't tell if that sport is good or not, haven't you told me that you have to play a sport for a considerable period of time before we can determine its effects?	
23	I255	Right.	
23	P255	So for this reason, it is quite hard to substitute Tai Chi with a second sport.	
23	I256	Well perhaps let's not say substituting Tai Chi, but if I introduce some exercises which you can do at home and which helps your knee osteoarthritis, would you be interested?	
23	P256	Well, if it helps, I will definitely be interested.	
23	I257	And if I am to introduce those activities to you, do you have a certain preference as to who will teach you, the venue and the format of teaching?	
23	P257	I don't have any specific preferences, and like the Chinese University, the format of teaching is most likely to be classes right?	
23	I258	Yes...	
23	P258	Well many elderly centres have those too.	
23	I259	Mm...	
23	P259	And there will be seminars and such…	

Duration of Interview: 55 minutes

23	I260	Mm...	
23	P260	Well we know because we have read those course outlines.	
23	I261	Mm...	
23	P261	For example, 2 or 3 weeks before the course start, we will be informed when people from the Chinese University will come and speak to us.	
23	I262	So that means you won't mind going to the community centre for group classes?	
23	P262	Yup, that will not be a problem.	
23	I263	Okay.	
23	P263	It will definitely be group classes, who will teach you one on one?	
23	I264	If you attend one of these classes, is there a time limit? Would you prefer a specific time of the day or prefer a certain length of time per lesson?	
23	P264	Well normally they are one-hour lessons.	
23	I265	Mm...	
23	P265	Time limit, of course there is, say, I am only available after my exercise session in the morning.	
23	I266	Mm…	
23	P266	You might be too tired after you have done your exercise and Yum Cha to be interested in whatever they have to say at those seminars, you might want to go home and rest.	
23	I267	So basically you don't want to be out for too long.	
23	P267	Yes exactly.	
23	I268	So basically you would want times that fit your lifestyle?	
23	P268	Yes.	
23	I269	Take your present lifestyle as an example, what would be the best time?	
23	P269	The best time is 9 in the morning, 9-10am	
23	I270	Mm...	
23	P270	Because other times, say for example in the afternoon… I would normally take an hour's nap after lunch.	
23	I271	Mm...	
23	P271	It's a habit, if I don't nap that day, I won't feel that good.	
23	I272	Not enough...	
23	P272	Yes, it's like my eyelids are drooping and I am dozing off.	
23	I273	So you would rather go to class after breakfast?	
23	P273	Yea.	
23	I274	Mm…	
23	P274	9-10am is the most ideal time.	
23	I275	So, when making your decision to attend those classes in the long run, are there any considerations like the location, transport, or the frequency of classes per week?	
23	P275	In that case…	

Duration of Interview: 55 minutes

23	I276	Are there any things that you have to take into consideration when picking up a new sport?	
23	P276	I don't think so, like that long term sport you have just explained, I don't think there is.	
23	I277	Mm...	
23	P277	You said it's long term, which means I have to learn and then practise by myself in the long run	
23	I278	Mm...	
23	P278	Like learning Tai Chi… of course you need a coach in the early stages, but as time goes by and you have gotten a grasp on those techniques, you don't always need a coach, you can practise by yourself too.	
23	I279	Mm, then what do you think if the center invites you to go back to the community centre after some time or have someone visit you and check on your learning progress?	
23	P279	I am fine with that.	
23	I280	Do you think equipment would be a matter of consideration when deciding whether you should pick up that course or not?	
23	P280	There will be a problem if those equipment are hard to find, or when they are too large and you simply don't have enough space to put them at home.	
23	I281	Mm...	
23	P281	It's acceptable if that piece of equipment is around the size of a radio.	
23	I282	Mm...	
23	P282	Then it will not be a problem.	
23	I283	You once had physiotherapy for about 2 weeks, was there some equipment used that you find it impossible to acquire? Say for example the bicycle or other machinery...	
23	P283	Heh,	
23	I284	Have the physiotherapist taught you any exercise that don't require equipment?	
23	P284	I don't think so.	
23	I285	So all of them require equipment.	
23	P285	Yes, all of them require equipment, like they have this towel like thing that they tie around your knee...	
23	I286	Mm.	
23	P286	And it gives off heat.	
23	I287	It feels hot...	
23	P287	Yes, it is tied around you knee for some time, not just myself, but many of us with knee osteoarthritis or a sore shoulder all agree that it's ineffective, and eventually we all stopped going back.	
23	I288	So, under the same reasoning, would you stop doing sports if you can't feel its effects?	
23	P288	Of course, everybody will do that too.	
23	I289	So that means if you feel the energy after practising Tai Chi and your knees hurt less, you would take up Tai Chi in the long run?	
23	P289	Yes.	

Duration of Interview: 55 minutes

23	I290	Mm... so you do sports as a habit, and if you have interest in it you would do it even if that sport isn't necessarily good for your knee?	
23	P290	Right, exactly, it's the same for everyone, if you are not interested in it, it's hard to commit to it despite all the good stuff people say about it.	
23	I291	Mm...	
23	P291	And for example, one or twice per week is no use, you have to do it every day.	
23	I292	Mm...	
23	P292	And at least 30mins every session.	
23	I293	Mm...	
23	P293	Only then it will be effective.	
23	I294	Mm, apart from interest, would you take up a new exercise if you can see its good effects?	
23	P294	I will, if it is good for the body that is.	
23	I295	If you are to try out a new sport, how long do you think the trial period should be, because like you said, you can't see the immediate effects of a sport within a short period of time.	
23	P295	Heh,	
23	I296	How much time would you need for observation?	
23	P296	I suppose 2 or 3 months. You can't see much in 1 month, but I will probably know in 2 or 3.	
23	I297	Mm…	
23	P297	I have this personal experience: one time the LCSD had this course on 易筋經 (a type of kung fu that improves blood circulation and relaxes muscles and tendons)	
23	I298	Mm...	
23	P298	The course outline looked like there are loads to learn, but after several months I don't think it fits me that much.	
23	I299	Mm…	
23	P299	So I stopped.	
23	I300	Mm...	
23	P300	I did sign up though.	
23	I301	Mm...	
23	P301	And learned everything on the syllabus.	
23	I302	Mm…	
23	P302	But it wasn't quite suitable for my knee osteoarthritis, because certain movements seemed too vigorous for the joints.	
23	I303	Too vigorous…	
23	P303	Yes, and that was too much for my body.	
23	I304	Mm, but still you have tried for a few months...	
23	P304	Yes, for a few months.	
23	I305	Mm…	
23	P305	It was taught between 3-4 in the afternoon.	

Duration of Interview: 55 minutes

23	I306	That course did not require special equipment, was that the main reason why you managed to attend it for 2 almost 3 months?	
23	P306	No, I signed up because they promoted that the course could relieve pains from knee osteoarthritis, high blood pressure and diabetes.	
23	I307	Mm...	
23	P307	And LCSD hired a tutor.	
23	I308	Mm…	
23	P308	So we signed up and learned class by class, we attended almost 6 classes, and one class lasted about 2 weeks.	
23	I309	Mm…	
23	P309	So I have practised for quite some time.	
23	I310	One class was almost 2 weeks…?	
23	P310	I mean one course	
23	I311	One course lasted for 2 weeks.	
23	P311	Yup	
23	I312	And you learnt for 2 weeks...	
23	P312	No, not 2 weeks, I have attended around 4 courses.	
23	I313	Wow, 4 courses, that would make 2 months!	
23	P313	Yes	
23	I314	So you attended classes for 2 months then practised at home for a couple more months?	
23	P314	Not a few months, but rather I practised at home and found that my knees hurt more after practising.	
23	I315	Oh so you had to practise after class?	
23	P315	They didn't ask us to practise at home. These people, the LCSD… it was like a community centre, like…	
23	I316	They did it together?	
23	P316	No, I was trying to say that they have a community centre next to the Shatin public swimming pool, they have a sports ground there.	
23	I317	Mm...	
23	P317	And there are classrooms...	
23	I318	Mm…	
23	P318	So I signed up for one of their classes and there were 30 people in a class.	
23	I319	Mm...	
23	P319	So, 30 people a class, and a coach taught us.	
23	I320	Mm...	
23	P320	So we met several times a week and for every course they have about 10 pages of material, each page detailing a move.	
23	I321	Mm...	
23	P321	And every time they would teach you one move.	
23	I322	Mm...	
23	P322	So you learnt but you couldn't guarantee that you could master all moves before the course ended, and then the second course would follow and you had to sign up and attend again...	

Duration of Interview: 55 minutes

23	I323	Mm...	
23	P323	So we attended those courses but after some time decided they are not that suitable for my knees, since they hurt more after those practises.	
23	I324	They hurt more.	
23	P324	Yes, the knees hurt more.	
23	I325	Mm…	
23	P325	So we thought it's unsuitable and stopped.	
23	I326	But was the pain only temporary, they only hurt at the beginning and less later on?	
23	P326	No, because those moves constantly strains the tendons.	
23	I327	Mm…	
23	P327	I couldn't adapt to those vigorous movements, but perhaps it might be suitable for other people that don't have knee osteoarthritis.	
23	I328	Mm...	
23	P328	It might not be so suitable for me as I have knee osteoarthritis.	
23	I329	So you attended that class for about 2months… you went there daily or...	
23	P329	No, we went every other day, Mondays Wednesdays, Fridays, or Tuesdays, Thursdays, Saturdays.	
23	I330	Mm... so it's	
23	P330	3 times per week.	
23	I331	So, 3 times a week, and each session lasted an hour?	
23	P331	Yes one hour.	
23	I332	And you wouldn't practise at home?	
23	P332	No I wouldn't	
23	I333	So you would only practise at the centre?	
23	P333	Yes yes	
23	I334	Mm, so… (pauses) how have you developed your views and knowledge on sports, through reading newspapers or from taking advice from your doctor?	
23	P334	Normally it is the doctor, they will always ask if you exercise and I said yes, a lot of doctors do that...	
23	I335	Mmm…	
23	P335	And they say you have to exercise and such.	
23	I336	Mmm...	
23	P336	After I retired yet before I picked up Tai Chi, I took walks in the central park every morning, I would normally stroll for about half an hour.	
23	I337	Mm...	
23	P337	It had this small hill which I would walk round every morning	
23	I338	Mm...	
23	P338	Like that...	
23	I339	You are motivated to exercise because the doctor starts asking about it?	
23	P339	Well, I have always known that exercising is good, and I love to exercise regardless of the doctor's inquiry.	

Duration of Interview: 55 minutes

23	I340	Mm...	
23	P340	It was just that I didn't have the time to do it back when I was still working.	
23	I341	Mmm.	
23	P341	So after I retired I stroll at the park because they have trees planted everywhere, it's very relaxing.	
23	I342	Mm...	
23	P342	And a lot of people do that in the morning too.	
23	I343	Mm, what do you think is the best method for learning a sport?	
23	P343	Based on past experiences I don't think there are any specific methods...	
23	I344	Well, but what approaches would help you learn faster should some one come and teach you?	
23	P344	It's different for everybody, sometimes the coach will teach pretty fast and she for example will have no problem learning, but for me, I can't understand the moves immediately.	
23	I345	Mm...	
23	P345	But as time goes by, I actually pick up faster than she does, I am now one of those fast learners. That's because I have the perseverance.	
23	I346	Mm...	
23	P346	Occasionally she will not go but I am different, I would go even when it rains.	
23	I347	Mm...	
23	P347	Even when it's cold	
23	I348	Mm...	
23	P348	I would still go.	
23	I349	So from what you've just said, I gather the coach would demonstrate the moves to you?	
23	P349	Yes.	
23	I350	Mm, but apart form demonstrations, do you think other methods could also help your learning? Such as audio tapes or diagrams where figures are drawn to detail each move, do you think these help?	
23	P350	For me, I think 2 things alone is enough to make a fruitful day.	
23	I351	Mm...	
23	P351	The first thing is to wake up every morning and exercise.	
23	I352	Mm...	
23	P352	And practise Tai Chi.	
23	I353	Mm...	
23	P353	For slightly more than an hour, and the second thing is to read the newspaper and do a bit of writing.	
23	I354	Mm...	
23	P354	I am really interested in writing and I can write and write...	
23	I355	Mm....	
23	P355	And there wouldn't be much thinking...	

Duration of Interview: 55 minutes

23	I356	Mm...	
23	P356	When I practise Tai Chi I won't use my head to think about other things.	
23	I357	Mm...	
23	P357	I don't think much when I write, and sometimes I can write poetry, it's very satisfying when you see you have written so many words.	
23	I358	Mm...	
23	P358	I have written a lot of things I thought I didn't know.	
23	I359	Mm...	
23	P359	It's very satisfying	
23	I360	Mm...	
23	P360	In writing…	
23	I361	Mm...	
23	P361	And those 2 things to me can make my day constructive and fulfilling.	
23	I362	So that's means you are not very interested in taking up a new sport.	
23	P363	No, not really.	
23	I364	Mm...	
23	P364	It'll just be those few things like playing Tai Chi every morning.	
23	I365	Mm, say for example you can bend your knee at 90 degrees, would you be interested in learning a sport that can help you bend more than that, a sport that can make your knees stronger and hurt less?	
23	P365	Well nowadays...	
23	I366	Have you ever considered?	
23	P366	Well the doctor I usually go to have told me pretty clearly…	
23	I367	Mm...	
23	P367	That unless I have an operation…	
23	I368	Mm...	
23	P368	Nothing much can improve my condition.	
23	I369	Mm...	
23	P369	He told me that I should have an operation, since other remedies won't work.	
23	I370	Mm...	
23	P370	Having an operation is the only way.	
23	I371	So you think that doing sports is generally good, but it doesn't help much in significantly improving your knee osteoarthritis...	
23	P371	Well not exactly, Tai Chi can temporarily relieve my pains, say for around half an hour before it starts to hurt again.	
23	I372	Mm…	
23	P372	And it hurts again when you start walking.	
23	I373	Mm…	
23	P373	Sometimes I think it has to do with blood circulation.	
23	I374	Mm...	
23	P374	It's like doing sports can improve blood circulation.	
23	I375	Mm…	
23	P375	That's probably the main reason.	

Duration of Interview: 55 minutes

23	I376	So exercise can slow the rate of deterioration?	
23	P376	Yes I think so.	
23	I377	Mm...	
23	P377	It probably helps, I think my condition could have been much worse had I not have regular exercise.	
23	I378	Mm... so exercising is not only a hobby but also a method to stop your condition from worsening?	
23	P378	Yes yes	
23	I379	Will this actually improve and heal your knees?	
23	P379	No, definitely not, the underlying theory is that my bones are softened and are deteriorating.	
23	I380	Mm…	
23	P380	So when you walk, your knees will be pressured when the joints rub against each other...	
23	I381	Mm...	
23	P381	That's why it hurts…	
23	I382	Mm...	
23	P382	So unless you don't walk, otherwise it will definitely cause pain.	
23	I383	Mm... so if you are to learn a new sport, say for example you can go to the centre and learn for about 2 weeks, and then carry on at home, do you think this new sport is acceptable in terms of the time needed? How much time will you invest on this new sport? Are you interested to try only when it hurts, or, are there situations that will make you opt out from trying this new sport?	
23	P383	Well these days I don't think I will be very interested to pick up a new sport, I think the only viable solution is to have an operation later on.	
23	I384	Mm...	
23	P384	I have talked about it with my family and they all agree that having an operation is the best way.	
23	I385	Mm...	
23	P385	Then it will be better, that's what the doctor told me, you have to have an operation.	
23	I386	Mm…	
23	P386	The doctor have already told me that right at the beginning, which was a long, long time ago.	
23	I387	Mm...	
23	P387	He said that I have to have an operation...	
23	I388	Mm…	
23	P388	And I have also read some materials about my condition.	
23	I389	Mm...	
23	P389	They say that the first time is fine but a second one will be very troublesome.	
23	I390	What do mean by the first and second time?	
23	P390	The first time you have an operation.	
23	I391	Mm...	
23	P391	10-15 years...	
23	I392	Before you have to change a new joint...	
23	P392	Yup	

Duration of Interview: 55 minutes

23	I393	Mm...	
23	P393	And the next time you change it, it will be very troublesome.	
23	I394	Mm...	
23	P394	That means...	
23	I395	Is that your biggest worry?	
23	P395	Yes, that is my biggest worry, well recently my doctor recommended me to do it, since I… might not need to change a second joint as I am quite old already, but anyhow I am still thinking about it…	
23	I396	Mm, I suppose that's all I have to ask, thank you for your time.	

Session One

The Nethersole School of Nursing

香港中文大學
那打素護理學院
膝關節炎長者運動計劃

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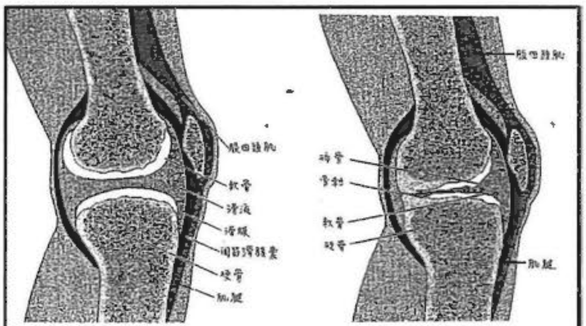


正常膝關節　　退化性膝關節炎

運動小貼士 (1)

1. **運動時，穿著舒適的衣服，尺碼合適及附有防滑膠底的運動鞋。**
2. **運動前，熱敷膝關節及其周圍的部位，有鬆弛作用， 並能減輕痛楚。熱敷時**間約20分鐘
3. 應先做15至20分鐘舒筋性運動，**作為熱身。**

運動小貼士 (2)

4. 在運動時應保持良好姿勢。
5. **在運動時，無須操之過急。應按著個人的體力進行，最好是在運動時仍能**與人談話。
6. **在運動時，如感到不適或膝關節痛楚顯著加劇，應立即停止運動，並考慮向醫生求助。**

舒筋性運動 (1)

是關節周圍肌肉之

活動及伸展 。

舒筋性運動 (1)

分為兩類:

1. 關節運動
2. **拉筋運動**

舒筋性運動 (1)

作用

- 減少僵硬
- 提昇關節之活動幅度
- 加強關節之靈活度
- 使日常活動更容易進行

關節運動 1：前踢腿


- 坐在椅上，雙腳稍微分開，平放地上，腳趾指向前方
- 坐直 (挺腰、收腹)
- 提高小腿及盡量伸直膝蓋
- 然後慢慢放下小腿
- 每隻腳重覆十次

關節運動 1：前踢腿

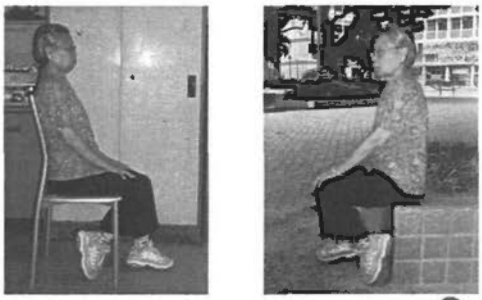
關節運動 1：前踢腿


關節運動 2：後踢腿


- 坐在椅上，雙腳稍微分開，平放地上，腳趾指向前方
- 坐直 (挺腰、收腹)
- 腳盡量向後踢
- 然後放回原位
- 每隻腳重覆十次

關節運動 2：後踢腿

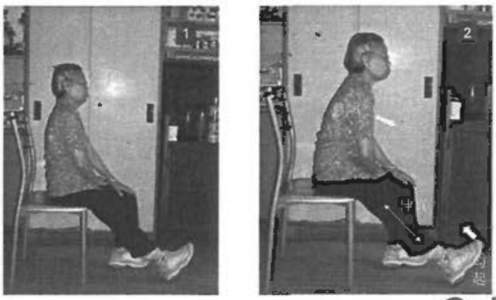
關節運動 2：後踢腿



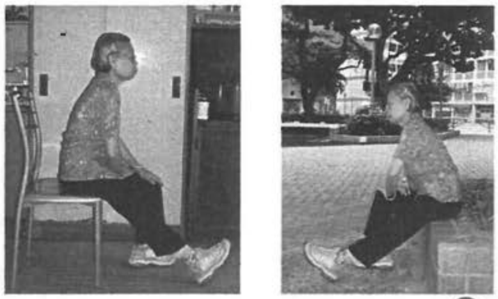
拉筋運動 1：拉大腿筋

- 坐直(挺腰、收腹)
- 把一腿伸直前置，腳掌勾起
- 雙手放於另一大腿上
- 面向前，眼向前看
- 上身前傾至前腳的後大腿筋有牽拉感
- 維持十秒
- 每隻腳重覆十次

拉筋運動 1：拉大腿筋



拉筋運動 1：拉大腿筋



總結

舒筋性運動

關節運動

1. 前踢腿
2. 後踢腿

拉筋運動

1. 拉大腿筋 (維持十秒)

早晚
各十次

Session Two

The Nethersole School of Nursing

香港中文大學
那打素護理學院

膝關節炎長者運動計劃

導師 :李鳳琴教授
香港中文大學那打素護理學院副教授

The Chinese University of Hong Kong

運動小貼士

1. 穿著舒適的衣服，運動鞋。
2. 運動前，熱敷膝關節及其周圍的部位20分鐘。
3. 應先舒筋性運動，作為熱身。
4. 保持良好姿勢。
5. 保持運動時仍能與人談話。
6. 如感到不適或膝關節痛楚顯著加劇，應立即停止運動，並考慮向醫生求助。

舒筋性運動

是關節周圍肌肉之活動及伸展。

分為兩類:

1. 關節運動
2. 拉筋運動

重溫舒筋性運動

舒筋性運動

關節運動

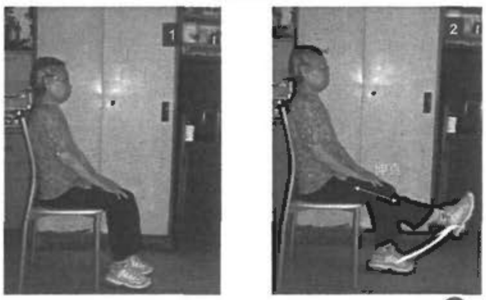
1. 前踢腿
2. 後踢腿

拉筋運動

1. 拉大腿筋 (維持十秒)

早晚
各十次

關節運動 1 : 前踢腿



關節運動 2 : 後踢腿

拉筋運動 1 : 拉大腿筋

拉筋運動 2 : 拉小腿筋

- 站立，雙手扶穩固物，距離一至兩尺
- 前後腳分開站立，雙腳貼地，腳趾指向前方
- 挺胸收腹；面向前，眼向前看
- 前腳屈膝，後腳保持伸直
- 前腳慢慢屈膝至後腳小腿有牽拉感
- 維持十秒
- 每隻腳重覆十次

拉筋運動 2 : 拉小腿筋

拉筋運動 2 : 拉小腿筋

肌肉鍛煉運動

是肌肉之鍛煉。

作用

- 避免肌肉萎縮
- 令肌肉更結實及有力
- 提昇膝關節的穩定性
- 減少膝關節疼痛
- 預防跌倒
- 減少由於少運動之骨質流失

肌肉鍛煉運動 1 :橡筋前踢腿

- 坐在椅上，雙腳稍微分開，平放地上，腳趾指向前方
- 坐直 (挺腰、收腹)
- 置橡筋帶於雙腳腳踝位置
- 提高右小腿及盡量伸直膝蓋
- 維持五秒
- 然後慢慢放下小腿
- 每隻腳重覆十次

肌肉鍛煉運動 1 :橡筋前踢腿

肌肉鍛煉運動 1 :橡筋前踢腿

總結

舒筋性運動

關節運動

1. [illegible]
2. [illegible]

拉筋運動

1. 拉大腿筋 (維持十秒)
2. 拉小腿筋 (維持十秒)

肌肉鍛煉運動

1. 橡筋前踢腿 (維持五秒)

早晚
各十次

Session Three

The Nethersole School of Nursing

香港中文大學
那打素護理學院
膝關節炎長者運動計劃

導師 :李鳳琴教授
香港中文大學那打素護理學院副教授

The Chinese University of Hong Kong

運動小貼士

1. **穿著舒適的衣服，運動鞋。**
2. 運動前，**熱敷膝關節及其周圍的**部位20分鐘。
3. **應先舒筋性運動**，作為熱身。
4. **保持良好姿勢。**
5. 保持運動時仍能與人談話。
6. **如感到不適或膝關節痛楚顯著加劇，應立即停止運動，並考慮向醫生求助。**

舒筋性運動

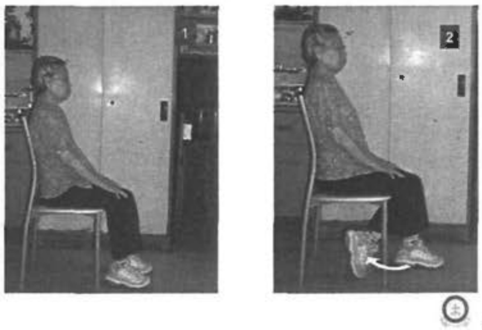
是關節周圍肌肉之活動及伸展。

分為兩類:

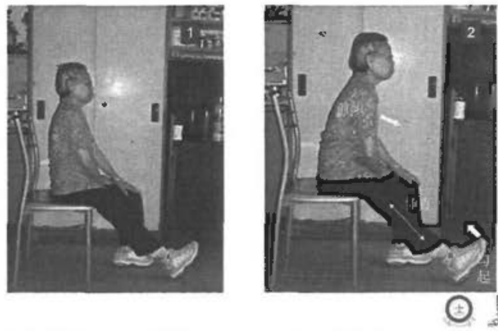
1. 關節運動
2. 拉筋運動

關節運動 1 : 前踢腿

關節運動 2 : 後踢腿



拉筋運動 1 : 拉大腿筋



拉筋運動 2 : 拉小腿筋

肌肉鍛煉運動

是肌肉之鍛煉。

作用

- **避免肌肉萎縮**
- **令肌肉更結實及有力**
- 提昇膝關節的穩定性
- 減少膝關節疼痛
- 預防跌倒
- 減少由於少運動之骨質流失

肌肉鍛煉運動 1 : 橡筋前踢腿

肌肉鍛煉運動 2 : 半蹲

- 站立，雙手扶穩固物
- 雙腳分開至肩膊闊度，腳趾指向前方
- 微屈雙膝約30度
- 維持五秒
- 慢慢站直
- 重覆十次

肌肉鍛煉運動 2 : 半蹲

肌肉鍛煉運動 2 : 半蹲

小結

舒筋性運動

關節運動

1. 前踢腿
2. **後踢腿**

拉筋運動

3. 拉大腿筋 (維持十秒)
4. 拉小腿筋 (維持十秒)

肌肉鍛煉運動

5. 橡筋前踢腿 (維持五秒)
6. 半蹲 (維持五秒)

早晚各十次

肌肉鍛煉運動 3：坐立

坐在椅上, 雙腳分開至與髀闊度，腳趾指向前方。

背部挺直, 身體微向前傾，感到腳掌前部分受力。

大腿用力，慢慢站起。

站起。

然後靠近椅子，身體微向前傾，同時屈膝，慢慢坐回椅上。

肌肉鍛煉運動 3：坐立

坐在椅上, 雙腳分開至與髀闊度，腳趾指向前方。

背部挺直, 身體微向前傾，感到腳掌前部分受力。

大腿用力，慢慢站起。

站起。

然後靠近椅子，身體微向前傾，同時屈膝，慢慢坐回椅上。

總結

舒筋性運動

關節運動

1. 前踢腿
2. 後踢腿

拉筋運動

3. 拉大腿筋 (維持十秒)
4. 拉小腿筋 (維持十秒)

肌肉鍛煉運動

5. 橡筋前踢腿 (維持五秒)
6. 半蹲 (維持五秒)
7. 坐立

早晚各十次

Session Four

The Nethersole School of Nursing

香港中文大學
那打素護理學院
膝關節炎長者運動計劃

導師:李鳳琴教授
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帶氧運動 1

- **是身體大部份之肌肉進行有規律及重覆的運動。**

作用

- 可加強心、肺及肌肉功能，從而令工作更持久，減少疲倦。
- 亦可協助優質睡眠，控制體重，改善整體身心感覺。

帶氧運動 2

建議時限

- 15 至30 分鐘

應避免劇烈或高沖撞性帶氧運動

帶氧運動建議:

- 步行
- 踏級
- 踏單車
- 游泳

運動小貼士

1. **穿著舒適的衣服，運動鞋。**
2. **運動前，熱敷膝關節及其周圍的部位20分鐘。**
3. 應先舒筋性運動，作為熱身。
4. 保持良好姿勢。
5. 保持運動時仍能與人談話。
6. 如感到不適或膝關節痛楚顯著加劇，應立即停止運動，並考慮向醫生求助。

舒筋性運動

是關節周圍肌肉之活動及伸展。

作用

- **減少僵硬**
- 提昇關節之活動幅度
- 加強關節之靈活度
- **使日常活動更容易進行**

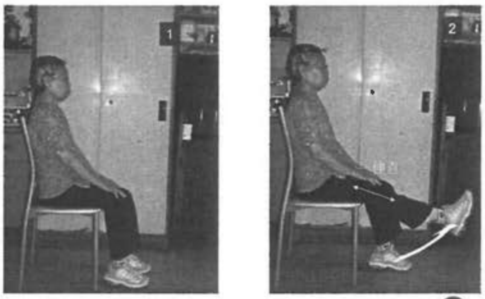
肌肉鍛煉運動

是肌肉之鍛煉。

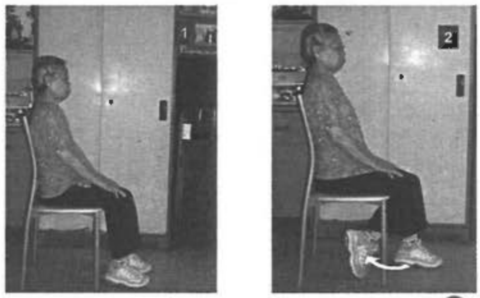
作用

- 避免肌肉萎缩
- **令肌肉更結實及有力**
- 提昇膝關節的穩定性
- **減少膝關節疼痛**
- **預防跌倒**
- 減少由於少運動之骨質流失

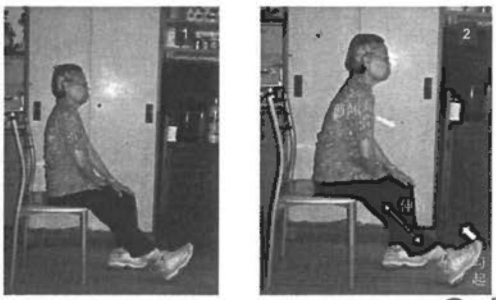
關節運動 1：前踢腿



關節運動 2：後踢腿

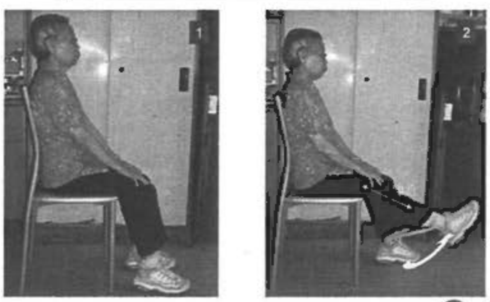


拉筋運動 1：拉大腿筋



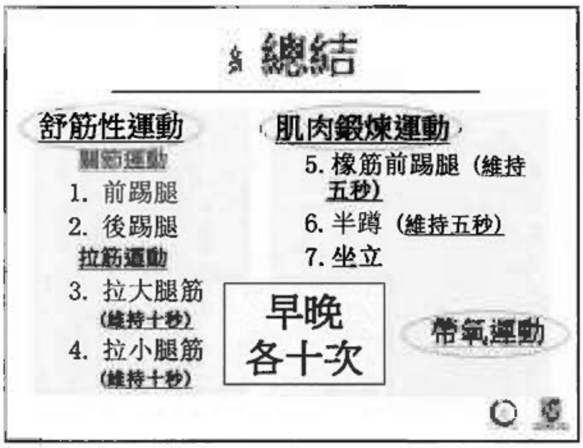
拉筋運動 2：拉小腿筋

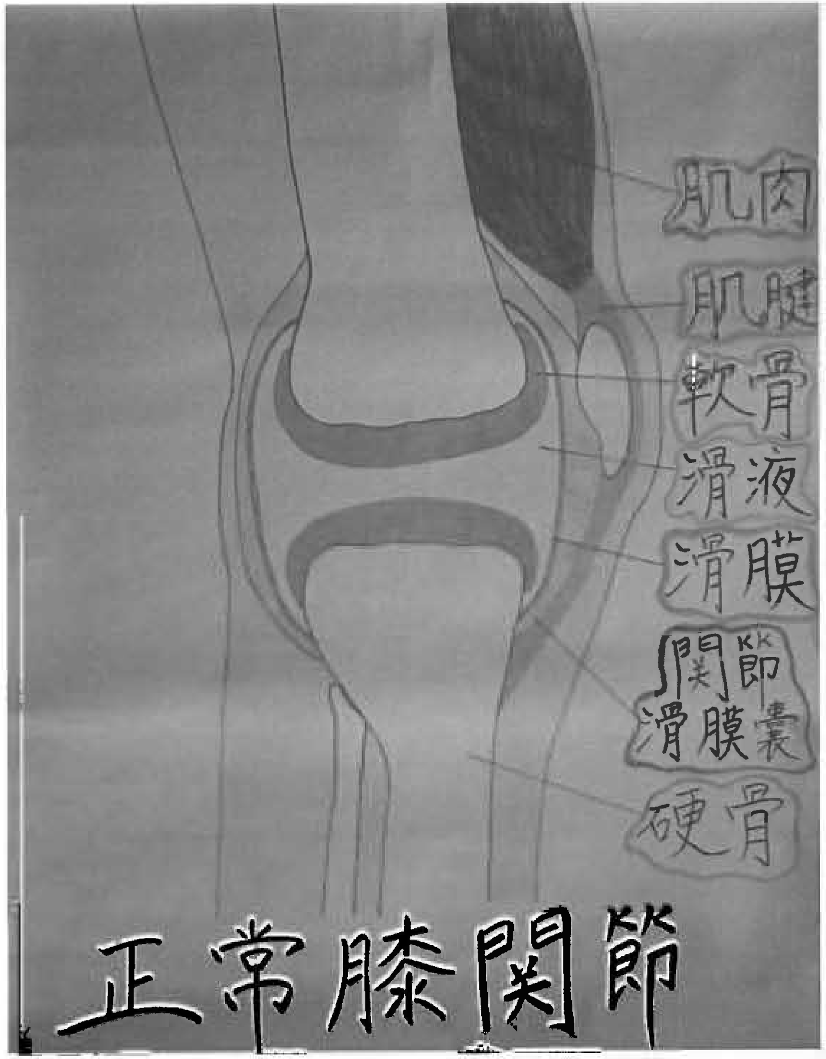
肌肉鍛煉運動 1：橡筋前踢腿



肌肉鍛煉運動 2：半蹲


肌肉鍛煉運動 3 : 坐立
1
2
3
4


總結
舒筋性運動
關節運動
1. 前踢腿
2. 後踢腿
拉筋運動
3. 拉大腿筋
(維持十秒)
4. 拉小腿筋
(維持十秒)
肌肉鍛煉運動
5. 橡筋前踢腿（維持五秒）
6. 半蹲（維持五秒）
7. 坐立
早晚
各十次
帶氧運動


肌肉
肌腱
軟骨
滑液
滑膜
關節滑膜囊
硬骨
正常膝關節

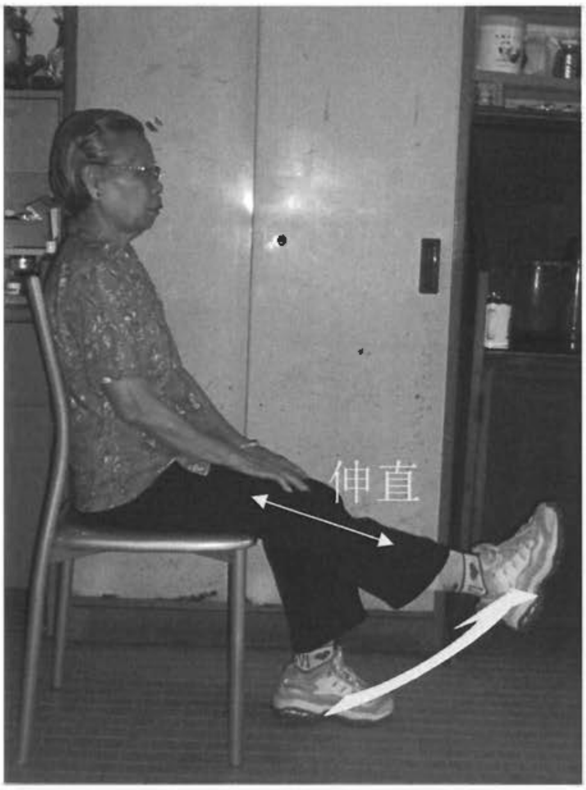

肌肉
間隙
碎骨
骨刺
肌腱
退化性膝關節炎

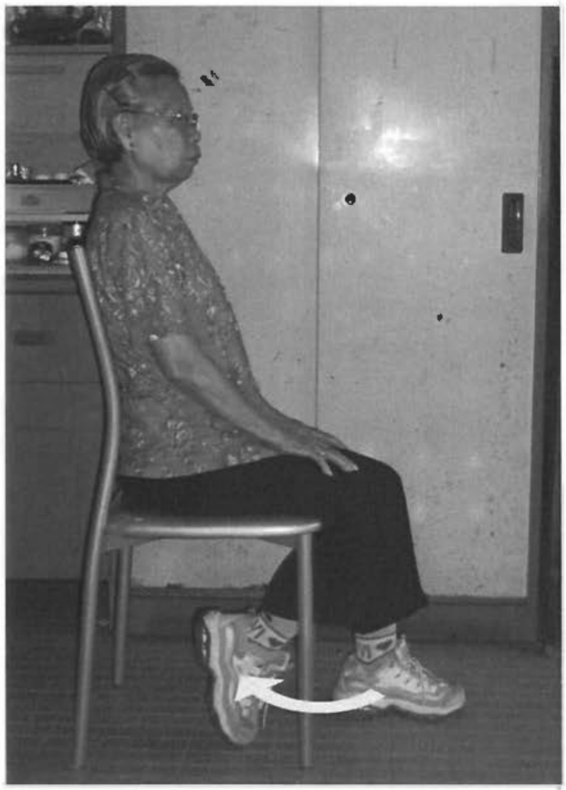
香港中文大學
那打素護理學院
膝關節炎長者運動計劃

關節運動：早晚各十次

姿勢

- 坐在椅上，雙腳稍微分開，平放地上，腳趾指向前方
- 坐直（挺腰、收腹）





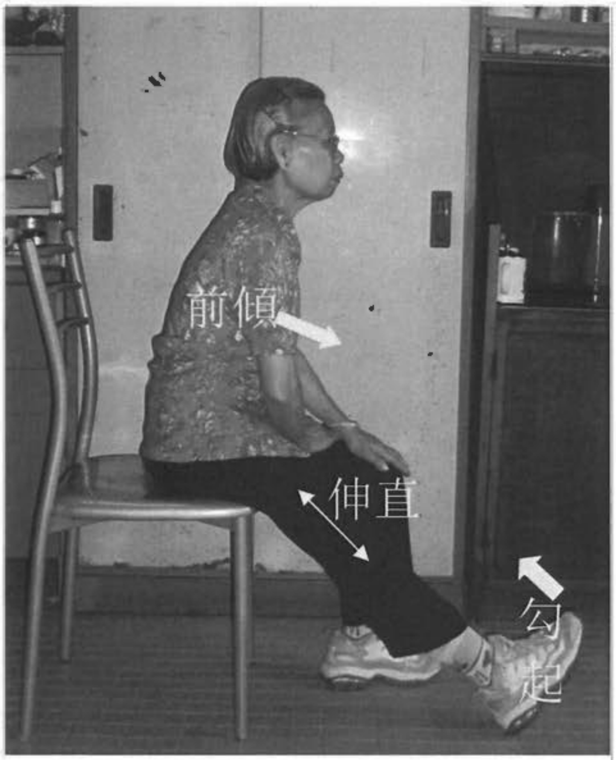
1. 前踢腿

- 提高小腿及盡量伸直膝蓋
- 然後慢慢放下小腿

2. 後踢腿

- 腳盡量向後踢
- 然後放回原位

拉筋運動：早晚各十次



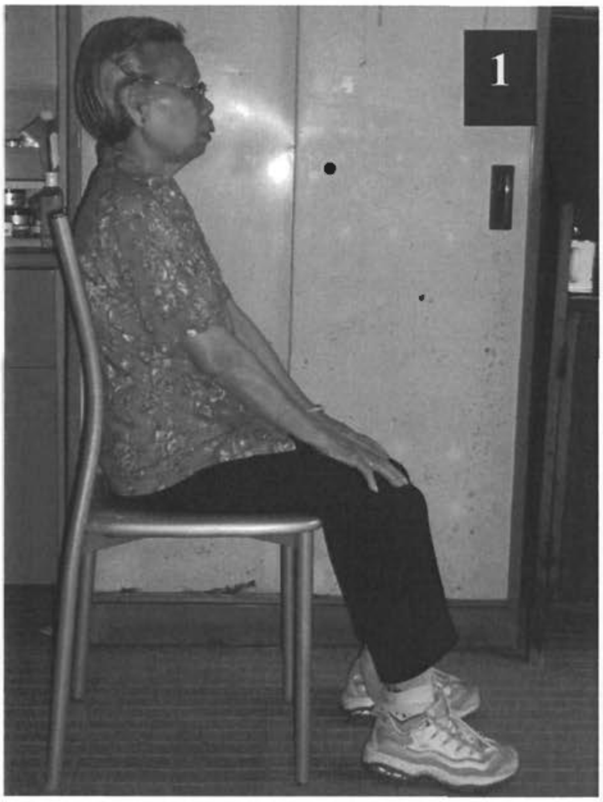
3. 拉大腿筋

- 坐直（挺腰、收腹）
- 把一腿伸直前置，腳掌勾起
- 雙手放於另一大腿上
- 面向前，眼向前看
- 上身前傾至前腳的後大腿筋有牽拉感
- <u>維持十秒</u>

4. 拉小腿筋

- 站立，雙手扶穩固物，**距離一至兩尺**
- 前後腳分開站立，雙腳**貼地，腳趾指向前方**
- **挺腰收腹**
- **面向前，眼向前看**
- **前腳屈膝，後腳保持伸直**
- **前腳繼續屈膝至後腳小腿有牽拉感**
- <u>維持十秒</u>

肌肉鍛煉運動：早晚各十次

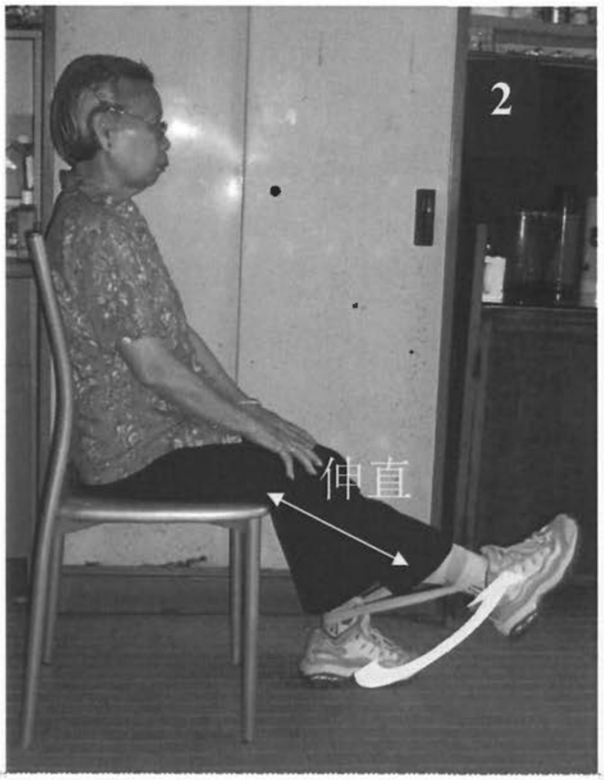


5. **橡筋前踢腿**

- 坐在椅上，雙腳稍微分開，平放地上，腳趾指**向前方**

- 坐直（挺腰、收腹）

- 置橡筋帶於雙腳腳踝位置

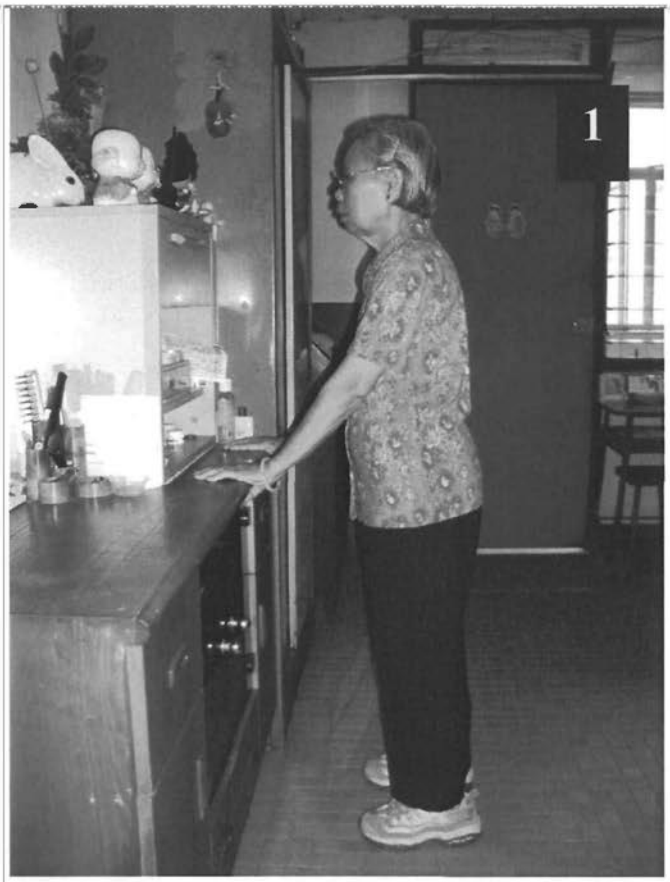


- **提高右小腿及盡量伸直**膝蓋

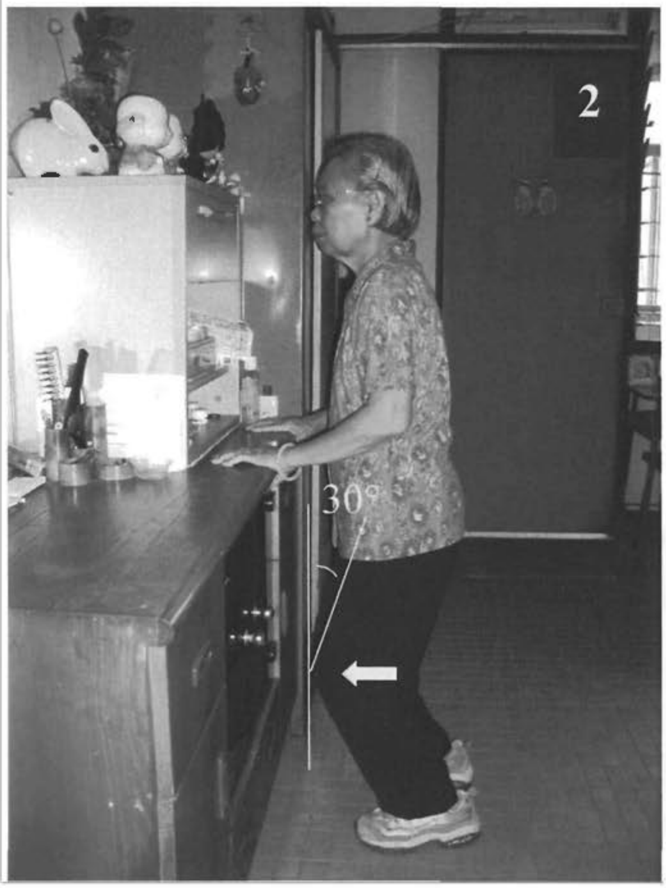
- **維持五秒**

- 然後慢慢放下小腿

6. 半蹲

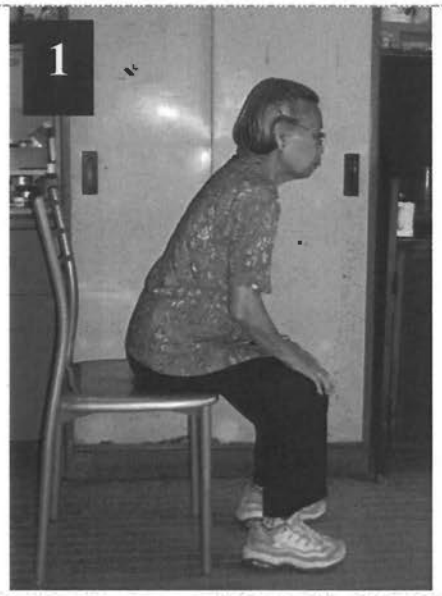


- 站立，雙手扶穩固物
- 雙腳分開至肩膊闊度，腳趾指向前方

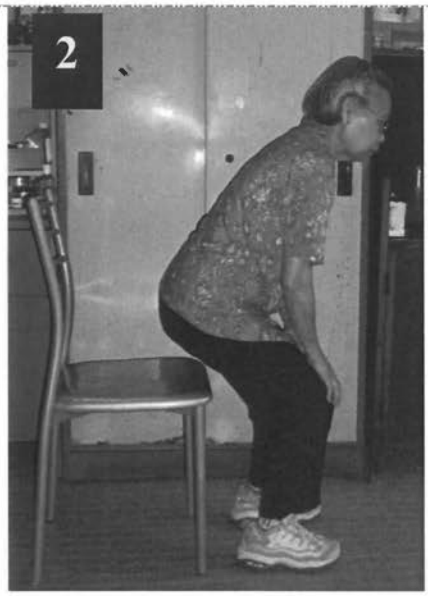


- 微屈雙膝約 30 度
- <u>維持五秒</u>
- 慢慢站直

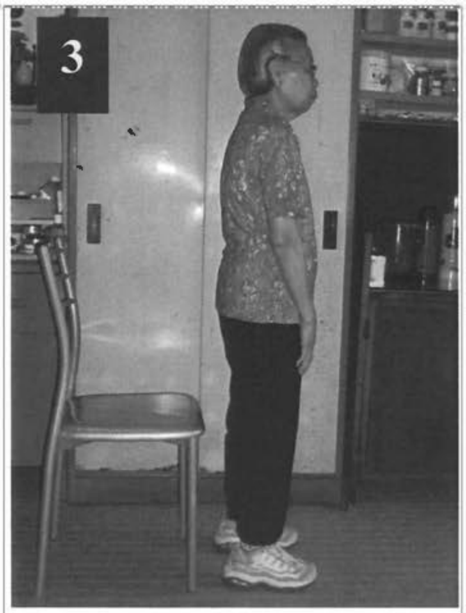
7. 坐立



- 坐在椅上，雙腳分開至肩膊闊度，腳趾指向前方
- 背部挺直，身體微向前傾，感到腳掌前部分受力



- 大腿用力，慢慢站起



- 站起

- 然後靠近椅子
- 身體微向前傾，同時屈膝
- 慢慢坐回椅上

運動小貼士

- 運動時，穿著舒適的衣服，尺碼合適及附有防滑膠底的運動鞋。
- 運動前，熱敷膝關節及其周圍的部位，有鬆弛作用， 並能減輕痛楚。熱敷時間約 20 分鐘。
- 應先做 15 至 20 分鐘舒筋性運動，作為熱身。
- 在運動時應保持良好姿勢。
- 在運動時，無須操之過急。應按著個人的體力進行，最好是在運動時仍能與人談話。
- 在運動時，如感到不適或膝關節痛楚顯著加劇，應立即停止運動，並考慮向醫生求助。

2008 年 6 月

香港中文大學
那打素護理學院
膝關節炎長者運動計劃

每種運動:早晚各十次

關節運動

1. 前踢腿　　2. 後踢腿

拉筋運動 維持十秒

3. 拉大腿筋　　4. 拉小腿筋

貼地

肌肉鍛煉運動 維持五秒

5. 橡筋前踢腿　　6. 半蹲

7. 坐立

「膝關節炎長者運動計劃」參加者
滿意程度問卷調查

對於今次所參加的運動計劃，請根據以下每一項，在最能形容你之滿意程度的一格內填上 √ 號。

		極同意	同意	無意見	不同意	極不同意
1.	運動計劃的內容適合我。	☐	☐	☐	☐	☐
2.	運動計劃的堂數及時間安排恰當。	☐	☐	☐	☐	☐
3.	運動計劃所提供的資料份量恰當。	☐	☐	☐	☐	☐
4.	運動計劃的討論部份有助我將所學習的運動應用於日常生活中。	☐	☐	☐	☐	☐
5.	我對導師的教授方法感到滿意。	☐	☐	☐	☐	☐
6.	我能記住在課堂所學習的運動。	☐	☐	☐	☐	☐
7.	我認為在課堂所學習的運動並不難做。	☐	☐	☐	☐	☐
8.	在我的日常生活中，我有時間持續在課堂所學習的運動。	☐	☐	☐	☐	☐
9.	我有信心把在課堂所學習的運動發展成為我日常生活中的運動習慣。	☐	☐	☐	☐	☐
10.	整體上，我對今次所參加的運動計劃感到滿意。	☐	☐	☐	☐	☐

其他意見:

____

____

香港中文大學

那打素護理學院

膝關節炎長者運動計劃

我的運動記錄

完成運動	1. 痛	2. 忙碌	3. 疲倦	4. 不適	5. 心情欠佳	6. 忘記	7. 外出

2008 年			星期一 20/10	星期二 21/10	星期三 22/10	星期四 23/10	星期五 24/10	星期六 25/10	星期日 26/10
1. 前踢腿		上午							
		下午							
2. 後踢腿		上午							
		下午							
3. 拉大腿筋		上午							
		下午							

4. 拉小腿筋		上午							
		下午							
5. 橡筋前踢腿		上午							
		下午							
6. 半蹲		上午							
		下午							
7. 坐立		上午							
		下午							

Return Demonstration Record Sheet **Subject Code:** ____________

Raise Leg	Incorrect	0	1	2	3	4	5	Correct	Remarks:
Kick Back	Incorrect	0	1	2	3	4	5	Correct	Remarks:
Stretch the Back of Knee	Incorrect	0	1	2	3	4	5	Correct	Remarks:
Stretch the Calf	Incorrect	0	1	2	3	4	5	Correct	Remarks:
Raise Leg ± resistance from an Exercise Band	Incorrect	0	1	2	3	4	5	Correct	Remarks:
Squat to half way	Incorrect	0	1	2	3	4	5	Correct	Remarks:
Rise up from Chair	Incorrect	0	1	2	3	4	5	Correct	Remarks:

Interview Guide for Post-Intervention Interviews

Questions	**Prompts**
What is your view about the exercise programme?	Comments and suggestions towards – relevancy of content, – amount of content, – duration & frequency – venue – mode of delivery – teaching of the coacher – usefulness of theoretical information – usefulness of recommended exercise – match with your expectation(s)
Can you tell me your experience of learning the recommended exercise in the programme?	Interested with the recommended exercise Any difficulties in – understanding how to do the movement – memorizing the movement – being strong enough to follow the movement – others
What is your experience of integrating the recommended exercise into daily living?	Positive / Negative experiences Facilitating / Restricting factors Determination in practicing the recommended exercise

WOMAC OSTEOARTHRITIS INDEX VERSION VA3.1

病人需知

A, B及C部的問題是用以下的形式來發問。請在橫線上劃上「✗」號來作答。

舉例：

1. 如把「✗」號劃在下列橫線的左端，即表示您不痛。

不痛 ✗———————————————| 極痛

2. 如把「✗」號劃下列橫線的右端，即表示您感到極痛。

不痛 |———————————————✗ 極痛

3. 請注意：
   a) 如「✗」號的位置越靠近右端，即表示越覺疼痛。
   b) 如「✗」號的位置越靠近左端，即表示疼痛越少。
   c) 勿把「✗」號劃在線的兩端以外。

請用上述的尺度方法來說明您在過去48小時所感受到的疼痛、僵硬及行動不便程度。

回答問卷時，請以您的__________(接受研究的關節)來作考慮。請指出您認爲由於__________(接受研究的關節)患有關節炎而引起的疼痛、僵硬及行動不便的嚴重程度。

您接受研究的關節是由專業健康護理人員所選定。如不確定那個是您接受研究的關節，請在填寫問卷前查詢。

A 部

疼痛

請回想在過去48小時您因爲關節炎而引致__________(接受研究的關節)感到的痛楚。

(請用「✗」號標出答案。)

問題： 您感覺有多痛？	只限研究人員使用
1. 在平地上步行。 不痛 ├──────┤ 極痛	PAIN1 ____
2. 上落樓梯。 不痛 ├──────┤ 極痛	PAIN2 ____
3. 晚上躺在床上時，如，干擾睡眠的疼痛。 不痛 ├──────┤ 極痛	PAIN3 ____
4. 坐著或躺著的時候。 不痛 ├──────┤ 極痛	PAIN4 ____
5. 直立的時候。 不痛 ├──────┤ 極痛	PAIN5 ____

B 部

僵硬的感覺

請回想在過去48小時您因爲關節炎而引致＿＿＿＿＿＿(接受研究的關節)僵硬(不是指疼痛)的感覺。

僵硬是指關節活動時靈活性減低的感覺。

(請用「X」號標出答案。)

	只限研究人員使用
6. 早上一醒來時你的僵硬感覺有多嚴重？ 不覺僵硬 ├──────────┤ 極度僵硬	STIFF6 ＿＿＿
7. 日間經過坐著, 躺著, 或休息後，您僵硬的感覺有多嚴重？ 不覺僵硬 ├──────────┤ 極度僵硬	STIFF7 ＿＿＿

C部

進行日常活動的困難

請回想在過去48小時，您因為＿＿＿＿＿＿(接受研究的關節)患有關節炎而令您在進行日常體力活動時的困難。**這里的的意思是指你在行動上及照顧自己的能力。**

(請用「✗」號標出答案。)

問題： 請問您的困難程度是什麼？

8. 落樓梯。

沒有困難 |————————————| 極度困難

9. 上樓梯。

沒有困難 |————————————| 極度困難

10. 從坐時站起來。

沒有困難 |————————————| 極度困難

11. 站立。

沒有困難 |————————————| 極度困難

12. 彎身向地下。

沒有困難 |————————————| 極度困難

13. 在平地上步行。

沒有困難 |————————————| 極度困難

只限研究人員使用

PFTN8 ＿＿＿

PFTN9 ＿＿＿

PFTN10 ＿＿＿

PFTN11 ＿＿＿

PFTN12 ＿＿＿

PFTN13 ＿＿＿

C部

進行日常活動的困難

請回想在過去48小時，您因爲＿＿＿＿＿(接受研究的關節)患有關節炎而令您在進行日常體力活動時的困難。這里的的意思是指你在**行動上及照顧自己**的能力。

(請用「**X**」號標出答案。)

問題： 請問您的困難程度是什麼？

	只限研究**人員使用**
14. 上落車，或上落巴士。 沒有困難 ├──────┤ 極度困難	PFTN14 ___
15. 行街買東西。 沒有困難 ├──────┤ 極度困難	PFTN15 ___
16. 穿上短襪或長襪。 沒有困難 ├──────┤ 極度困難	PFTN16 ___
17. 起床。 沒有困難 ├──────┤ 極度困難	PFTN17 ___
18. 脫下短襪 或長襪。 沒有困難 ├──────┤ 極度困難	PFTN18 ___
19. 挨 在 床上。 沒有困難 ├──────┤ 極度困難	PFTN19 ___

C部

進行日常活動的困難

請回想在過去48小時，您因為____________(接受研究的關節)**患有關節炎而令您在進行日常體力活動時的困難。這里的的意思是指你在行動上及照顧自己的能力。**

(請用「✗」號標出答案。)

問題： 請問您的困難程度是什麼？	只限研究人員使用
20. 踏進或踏出浴缸。	
沒有困難 ├────────────────┤ 極度困難	PFTN20 ____
21. 坐著。	
沒有困難 ├────────────────┤ 極度困難	PFTN21 ____
22. 坐上座廁或離開座廁。	
沒有困難 ├────────────────┤ 極度困難	PFTN22 ____
23. 做粗重家務。	
沒有困難 ├────────────────┤ 極度困難	PFTN23 ____
24. 做輕巧家務。	
沒有困難 ├────────────────┤ 極度困難	PFTN24 ____

標準十二題簡明健康狀況調查表－第二版

The Chinese (Hong Kong) SF-12 Health Survey-Standard Version 2

編號

標準十二題簡明健康狀況調查表-第二版

說明：這項調查是詢問您對自己健康狀況的了解。此項資料記錄您的自我感覺和日常生活的情況。

請在一個方格內填上 X 號來回答每個問題。如果您不肯定怎樣回答，請按照您的理解選擇最合適的答案。

1. 總括來說，您認為您的健康狀況是：

極好	很好	好	一般	差
□ 1	□ 2	□ 3	□ 4	□ 5

2. 下列各項是您日常生活中可能進行的活動。以您目前的健康狀況，您在進行這些活動時，有沒有受到限制？如果有的話，程度如何？

	有很大限制	有一點限制	沒有任何限制
a. 中等強度的活動，比如搬桌子，使用塵器清潔地面，玩保齡球或打太極拳	□ 1	□ 2	□ 3
b. 上幾層樓梯	□ 1	□ 2	□ 3

3. 在過去四個星期裏，您在工作或其它日常活動中，有多少時間會因為身體健康的原因而遇到下列的問題？

	常常如此	大部分時間	有時	偶爾	從來沒有
a. 實際做完的比想做的要少	□ 1	□ 2	□ 3	□ 4	□ 5
b. 工作或其它活動的種類受到限制	□ 1	□ 2	□ 3	□ 4	□ 5

4. 在過去的四個星期裏，您在工作或其它日常活動中，有多少時間由於情緒方面的原因（比如感到沮喪或焦慮）遇到下列的問題？

	常常如此	大部分時間	有時	偶爾	從來沒有
a. 實際做完的比想做的要少	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. 工作時或從事其它活動時不如往常細心了	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. 在過去四個星期裏，您身體上的疼痛對您的日常工作（包括上班和家務）有多大影響？

毫無影響	有很少影響	有一些影響	有較大影響	有極大影響
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. 下列問題是有關您在過去四個星期裏您覺得怎樣和您其它的情況。針對每一個問題，請選擇一個最接近您的感覺的答案。在過去四個星期裏有多少時間：

	常常如此	大部分時間	有時	偶爾	從來沒有
a. 您感到心平氣和？	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b. 您感到精力充足？	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c. 您覺得心情不好，悶悶不樂？	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. 在過去四個星期裏，有多少時間由於您的身體健康或情緒問題妨礙了您的**社交活動（比如探親、訪友等）？**

常常有妨礙	大部分時間有妨礙	有時有妨礙	偶爾有妨礙	完全沒有妨礙
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Date: ________________ **Subject Code:** ________

Socio-demographic Data

Coding

Age / Sex		
Telephone contact		
Education		
Marital status		
Type of residence		
Living arrangements		
Employment status		
Financial source		
Exercise habit		

Functional Tests Results

	Pre-Test ( )	**Post-Test** ( )
Knee ROM degrees		
TST seconds		

BMI(Kg/m^2):

Weight	Kg
Height	m
BMI	Kg/m^2

Date: ________________ Subject Code: _________

Clinical Data

Coding

Medical Diagnosis of KOA		
Clinical Diagnosis of KOA		
Duration of Symptoms		
Bilaterality of Symptoms		
Use of Walking Aids		
Previous Knee Surgery		
Medical Prescription for KOA		
Other medical chronic disease(s) and medications		

The Chinese University of Hong Kong
The Nethersole School of Nursing

Study Title:
A pilot study to assess the feasibility of an exercise programme for older Chinese people with knee osteoarthritis.

Principle Investigator: Lee Fung Kam Iris
Associate Professor
The Nethersole School of Nursing
The Chinese University of Hong Kong

The purpose of this study is to test the feasibility of an exercise programme for promoting the health of older Chinese people with knee osteoarthritis in Hong Kong. The findings can provide information on implementation of exercise programme in older Chinese people with osteoarthritis of the knee. This study requires the participants to attend an exercise programme, which consists of four one-hour weekly sessions, and two 30-40 minutes assessment sessions scheduled at before and 3-month after the exercise programme. In addition, the participants will be requested to complete a satisfaction questionnaire. All the information obtained will be kept confidential and used for research purpose only. The raw data will be stored in lock area for 5 years according to the policy of the study institution. Participants are free to refuse any assessment question or procedure. Participants are also free to withdraw their consent and terminate their participation at any time. All the decisions on participation of this study will not in any way be discriminated or affect the services provided for the participants by the community centers.

For any questions related to the study, please contact Prof. Lee Fung Kam Iris at Tel: 2609 6228.

Consent Form for Participants

THIS IS TO CERTIFY THAT I, ____________________________ HEREBY agree to participate voluntarily in the above named study.

I understand that I am required participating an exercise programme, which consists of four one-hour weekly sessions, and two assessment sessions.

I hereby give permission to be assessed and for these assessment data to be recorded.

I understand that I am free to refuse any assessment question or procedure.

I also understand that I am free to withdraw my consent and terminate my participation at any time.

I understand that my decision on the participation of this study will not in any way be discriminated or affect the services provided to me by the community center.

____________________________ Date: ______________________
Signature (Participant)

____________________________ Date: ______________________
Signature (Researcher)

香港中文大學
那打素護理學院

研究題目 ： 試驗性研究: 一項運動計劃對於促進中國老年病人膝關節炎健康之可行性。

主要研究員: 李鳳琴女士
香港中文大學那打素護理學院副教授

此研究之目的是測試一項運動計劃對於促進中國老年病人膝關節炎健康之可行性。研究結果將為進行中國老年病人膝關節炎運動計劃提供資料。此研究需要參加者參與一項運動計劃，期間包括出席為期四星期，每星期一小時之運動集會，及兩次約 30-40 分鐘之評估。評估將安排於運動計劃之前及三個月後進行。所有資料會作保密及只作研究之用，資料亦會於研究完成五年後被銷毀。過程中，參加者有權拒絕回答任何評估問題或程序。參加者亦可隨時退出及終止參與該項運動計劃。參加者於此研究所作出之任何決定將不會受到歧視及將不會影響參加者在社區中心所接受之服務。

如對此項研究有任何問題，請致電李鳳琴教授，電話號碼：2609 6228。

Code:________

參加者同意書

本人________________此聲明同意自願參加上述研究。

本人明白本人需要參與一項運動計劃，期間包括出席為期四星期，每星期一小時之運動集會，及兩次約 30-40 分鐘之評估。

本人在此授予評估之權利及此等評估資料可作為紀錄之用。

本人明白本人有權拒絕回答任何評估問題或程序。

本人明白本人可隨時退出及終止參與該項運動計劃。

本人明白本人在此項研究中所作出之任何決定將不會受到歧視及將不會影響本人在社區中心所接受之服務。

________________ ________________
參加者簽署 研究員簽署

日期:________________ 日期:________________

The Chinese University of Hong Kong
The Nethersole School of Nursing

Study Title:
A pilot study to assess the feasibility of an exercise programme for older Chinese people with knee osteoarthritis in Hong Kong.

Principle Investigator: Lee Fung Kam Iris
Associate Professor
The Nethersole School of Nursing
The Chinese University of Hong Kong

The purpose of this study is to test the feasibility of an exercise programme for promoting the health of older Chinese people with knee osteoarthritis in Hong Kong. The findings can provide information on implementation of exercise programme in older Chinese people with osteoarthritis of the knee. This study requires the participants to attend a 45-minute interview. During the interview, questions regarding your views on and experiences of the exercise programme of this study and your self-practice of the exercise at home will be asked. The interview will be audio-recorded. All the information obtained will be kept confidential and used for research purpose only. The raw data will be stored in lock area for 5 years according to the policy of the study institution. Participants are free to refuse answering the interviewer's questions during the interview. Participants are also free to withdraw their consent and terminate their participation at any time. All the decisions on participation of this study will not in any way be discriminated or affect the services provided to the participants by the community centers.

For any questions related to the study, please contact Prof. Lee Fung Kam Iris at Tel: 2609 6228.

Consent Form for Participants

THIS IS TO CERTIFY THAT I, ____________________ HEREBY agree to participate voluntarily in the above named study.

I hereby give permission to be interviewed and for these interviews to be audio- recorded.

I understand that I am free to refuse answering the interviewer's questions during interview.

I also understand that I am free to withdraw my consent and terminate my participation at any time.

I understand that my decision on the participation of this study shall not in any way be discriminated or affect the services provided to me by the community center.

________________________ Date: ____________________
Signature (Participant)

________________________ Date: ____________________
Signature (Researcher)

香港中文大學
那打素護理學院

研究題目 ： 試驗性研究: 一項運動計劃對於促進中國老年病人膝關節炎健康之可行性。

主要研究員: 李鳳琴女士
香港中文大學那打素護理學院副教授

此研究之目的是測試一項運動計劃對於促進中國老年病人膝關節炎健康之可行性。研究結果將為進行中國老年病人膝關節炎運動計劃提供資料。此研究需要參加者參與一項約 45 分鐘之面談。面談期間，問題將會涉入你對此項運動計劃之意見及體驗，並你在日常生活中進行在課堂所學習的運動的體驗。該次面談將會被錄音。所有資料會作保密及只作研究之用，錄音資料亦會於研究完成五年後被銷毀。於面談過程中，參加者可拒絕回答問題。參加者亦可隨時退出及終止參與此次面談。參加者於此研究所作出之任何決定將不會受到歧視及將不會影響參加者在社區中心所接受之服務。

如對此項研究有任何問題，請致電李鳳琴教授，電話號碼：2609 6228。

Code:________

參加者同意書

本人____________________此聲明同意自願參加上述研究。

本人在此授權被面見及將面談過程錄音。

本人明白本人有權拒絕回答問題。

本人明白本人可隨時退出及終止參與此次面談。

本人明白本人在此項研究中所作出之任何決定將不會受到歧視及將不會影響本人在社區中心所接受之服務。

參加者簽署 研究員簽署

日期: __________ 日期: __________

THE CHINESE UNIVERSITY OF HONG KONG

M E M O

To	:	Prof. Lee Fung Kam, Iris The Nethersole School of Nursing (PhD in Nursing)
From	:	Secretary Survey and Behavioural Research Ethics Committee (SBREC)
Tel.	:	2609 6238
Date	:	17 April 2008

Survey and Behavioural Research Ethics

I write to inform you that the SBREC has granted approval to you for conducting the following research:

Project Title	:	A pilot study to assess the feasibility of an exercise programme for older Chinese people with knee osteoarthritis
Source of Funding	:	Direct Grant 2007-08 (2nd Round)
Reference, if any	:	Nil

Thank you for your attention.

Sulan.

Sulan Wong

c.c. Panel Secretary concerned

Appendix 5.13

明愛牛頭角長者中心

CARITAS ELDERLY CENTRE — NGAU TAU KOK

11th July 2008

The Nethersole School of Nursing
The Chinese University of Hong Kong

Dear Sir / Madam,

A Pilot Study to Assess the Feasibility of an Exercise Programme for Older Chinese People with Knee Osteoarthritis

Regarding the captioned matter, I am writing to confirm that our center is much appreciated to co-operate with your University to carry out the above research study by your staff, Miss Iris Lee Fung Kam from June to October 2008 . As agreed by your Associate Professor, Miss Lee and our staff, our center would help in recruiting needy elders at June to participate in the individual assessment for suitable candidates to join the four exercise groups, which will organize from July to August 2008. Afterwards, our staff would continue to encourage the participants to practice the exercise, which they learned in the captioned groups till the end of the study.

If you have any queries, please feel free to contact our staff, Miss Mabel Pak at 2750 2727 ext 35.

Regards,

Ms. Wong Mei Kuen
Social Work Supervisor

九龍牛頭角安德道1號2字樓201-202室 Rm. 201-202, 2/F, 1 On Tak Road, Ngau Tau Kok, Kln.
電話 Telephone: 2750 2727內線 ext : 35
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電子網頁 Web Site: http://www.caritasse.org.hk
電子郵箱 E-Mail: sentk@caritassws.org.hk